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APPRENTICES IN MACHINE SHOPS.

What the work of manufacturers having machine shops requires is thorough skill on the part of the workmen, so as to secure the best possible results. Unskilled workmen are at a discount. Of these, however, there are a large number, and from time to time, in the absence of better men, they are drawn on to fill up the requisite complement of hands, often with a decidedly disorganizing effect on their fellow workmen. With the rapid enlargement of all branches of the machine business, prospective requirements cannot be overlooked, and engineering and other firms have naturally been driven to consider the idea of taking measures to educate hands for their business. The material is to be found in youth with a natural aptitude for mechanical pursuits, and who need to be systematically trained to rank hereafter as skilled workmen. It would be impossible to renew here the apprentice system, such as it exists abroad. Youth could not be found who would submit to restrictions which even in England and Scotland are regarded as slavish, and which have been enforced by stringent laws which no State Legislature in this country would pass. Probably no system can be devised owing to the present conditions of mechanical work, which is applicable under all circumstances. Where there is not a sustained demand for a considerable number of hands, or where these vary with the season or the supply of orders, other arrangements must be made than those which apply where there is a certainty of constant work. So far, in a number of large manufacturing concerns in the East and West, systems have been devised which secure to youth a continuous education with an ever-ascending scale of remuneration under conditions by no means binding if the apprentice chooses to break away, but which strongly appeal to his self-interest in the future. In one large establishment the apprentices taken in are held to their initial obligations by keeping back from their monthly pay an amount that counts up to a considerable sum for the first year. For the second year the full pay is given, and so on until the end of the term of apprenticeship service, when the accumulation is paid in gross. The company thus makes itself a custodian of a portion of the earnings of the apprentice, with a surety that, at the end of the term of apprenticeship, the graduating journeyman will have all the advantage in dollars he has waited for. This waiting on holds the apprentice to his honest duty for the prescribed term of years, and the result is that the apprentice who serves his time finds himself, at the end of his novitiate, in possession of a sum that, no longer held as security against dishonest work or its shirking, is a valuable assistance to him when he can claim it in its entirety. Protection is thus afforded against the whims of an apprentice, who certainly would not benefit by a half training. Every motive, in fact, exists A system found so excellent in its working, and which for workshops of reputation secures an ample supply of youth, will, no doubt, be steadily extended. All inducements that can reasonably be put forward exist to induce apprentices to remain to the end of their term. After that time it may reasonably be assumed that they will give a preference to the establishment in which they were trained to any other, and, indeed, this is the calculation of the manufacturers who have introduced this modified system of apprenticeship.

ADHESION OF FLAT DRIVING BELTS.

No one who has examined critically the theories as to flat driving belts, in connection with published experiments, made by such men as Morin, Briggs & Towne, Cooper and Webber, can have failed to observe remarkable discrepancies, some of the tests affirming and others contradicting the set data. Mr. Robert Grimshaw in discussing the subject before the Franklin Institute stated that the elements governing the adhesion of flat driving belts to pulleys are pulley diameter, material and condition, and amount of crown, arc of contact, and belt material and condition, width and thickness and tension. Each of these exerts an influence upon the adhesion; these influences being modified and in some cases neutralized, or even reversed, by the others. Of only one of them (arc of contact) it may be said that there are no apparent contradictions in its action. The belts used in testing were rubber, single and double leather oak-tanned, waterproof and fulled, and wire centers; and canvass covered with composition. At the meeting there were turned iron pulleys of 18 and 36 inches diameter, and a 36-inch "taper sleeve" wooden pulley. The belt to be tested was placed centrally upon the desired pulley, and one end weighted with a given amount per inch of width, both shaft and pulleys being held from turning. Force was applied at the other end until the belt slowly slipped. The difference between the weights on each end represented the amount of friction of the belt upon the pulley, or the grip under the circumstances. The tension is applied by dead weights in a cage (the weight of the clamps and the cage being allowed for) or, for convenience,—the weights often exceeding a ton, by a lever of the second class, having its fulcrum under the center of the shaft and its point of application of force to the belt in a vertical line tangent to the pulley at the point in the horizontal plane of the shaft. The dynamometer, one of Fairbank's standard traction machines, is first tested by hanging dead weights upon it, at each division at which it is to be used; and in testing the belts the mean of four readings is taken. As the result of over 900 tests and readings made, Mr. Grimshaw announced that the influence of increased pulley diameter is always to increase the drive; especially with light tensions. The influence of pulley material is so largely modified by the other conditions that no general rule can be laid down concerning it. The same is true of belt material. Increasing the belt thickness does not always increase the driving power, especially with small pulleys, wide belts and light tensions. Increasing the arc of contact may be said to increase the drive in every case yet known. Increasing the tension increases the drive to a certain point, beyond which, in many cases, no further increase of tension will cause any augmentation in the grip. To the inquiry as to which were the most durable, rubber or leather belts, Mr. Grimshaw replied that in dry places leather was the most durable; while for damp places rubber only would answer. Rubber was rapidly deteriorated by mineral oils, and could not be used for quarter twist and crossed belts. The conditions of friction vary so that without all conditions being taken into account, tests are of no value in determining the driving power of belts at high speeds. As to canvas belts, he considered that their tractive powers were exceptionally good. He added further as to tests that the friction between belt and pulley is the same as that between the pulley and the belt; that the driving power of any belt is measured by the difference between the tight and the loose sides, the pulley getting all the difference in the tension. As regards the danger of breaking the belts, the tension possible to put upon any belt is determined by the strength of the lacing or other fastening, and for lacings, the maximum safe strain as laid down by Briggs and Towne, is 66⅔ pounds per inch wide; whereas single oak-tanned leather belting breaks at 1000 pounds per inch of width. Hence this method of testing not only registers correctly both the light and the heavy tension, but the difference or grip does not induce artificial conditions.

MAGNETISM AS A TEST AGENT.

Magnetism, as represented by the deflections of the magnetic needle, is evidently destined to be put to important account in testing the qualities of iron and steel. Blows from a hammer will at times fail to detect a flaw in a casting or forging; it is besides a cumbrous method when a machine, wheel or other article is in actual use. A magnetic needle for the detection of flaws in iron and steel is in common use at Woolwich Arsenal, England, and if useful there, it should be useful elsewhere. An instrument which has secured much attention from scientists has been devised with a view to determining the carbon in steel by means of magnetic deflections. The latter instrument may not be exact enough in carbon determinations, but it might be made very useful in helping to determine total quantities of iron and other substances. The polarizing a bar of iron or steel, with carefully collated results, accompanied by an analysis, may in time lead to exact conclusions as to the precise amount of carbon present. If tables of physical tests of steel be examined, and notably, Kirkaldy's tests of Fagersta steel, the highest resistance to all strains except compression will be found at about 0.90 carbon. Now, it has been suggestively remarked: "If a little needle will point out every defect in the interior of a huge forging; if a delicate pendulum will indicate quantities of iron and substances not iron; if an obedient force, held in a little instrument in one hand, may be made to produce an effect in a piece of steel passed over it in the other hand equal to a strain of more than 50,000 pounds, who will say that the great Emery testing machine may not some day be declared a very cumbersome and unnecessary thing? Is it not possible that the engineer of the future will carry with him in a grip sack all of the tools necessary to tell him all he needs to know about the material he is getting for his structures?" In reference to the power that may be exerted by magnetism in the way of strain, we may explain that if a piece of steel be powerfully magnetized it is found to be lengthened in the direction of the force and reduced in the section in a direction perpendicular to the force. Here, then, is a change of form, but no change of volume, representing on a bar 1 inch square the amount of force named above.

NICKEL PLATING.

Nickel plating has come to occupy such a prominent place in the industries of the country, in the way of finishing metallic surfaces by electro deposits of the metal, that suggestive hints as to the method of carrying on the processes of plating, derived from English and continental practice, will prove of service. In passing through workshops in which nickel plating is carried on, we have several times encountered failures, or found imperfect and unequal deposits, traceable to insufficient acquaintance by some of the workmen with the special conditions requisite for putting to best account electrical qualities. The first and most obvious precaution is to make certain that there is no break of metallic continuity in the conducting paths between the generator of current and the plating solution. This implies that at the points of contact of the conducting wires or straps, both at the generator and vat, there exists no oxide or other dirt to obstruct the free passage of the current. Hence the extremities of the wires and the binding screws must be bright and clean where they touch each other. And further, the wires must be gripped firmly by the screws. It is also advisable to use gutta percha or hemp covered wires to guard against any conducting path to the current before it reaches the vat. The best kind of conducting fittings for the plating vessel are probably two runs or rectangles of brass tubing, fixed on the upper edge of the vat, extending around the edge and protected, to prevent spilling and short circuiting, by a wooden ledge. This arrangement allows of anodes or articles being hung at any part of the vat. The outer rectangle is to be connected with the positive and the other with the negative pole. The suspension wires should be of clean copper or brass.

The preparation of the goods to be nickeled, whether copper, brass, steel or iron is an important point. Steel and iron articles may be advantageously treated with a thin layer of copper, in a bath of cyanide of copper and potassium. The articles must be perfectly clean; even a finger mark will cause the deposit to be liable to strip off at that point. Any scratches will cause the deposit to be rough and unsatisfactory. The position of the goods in the solution will affect results. The vertical is the best, as warding off impurities which collect on horizontal anodes and spoil the surface. As soon as the articles are placed in solution the current should be started. The current must be strong at the outset, but moderated as soon as a complete deposit, however thin, covers the articles. The solution should contain from three to five ounces of nickel to the gallon. Neutral tinted litmus paper should be used frequently in order to ascertain the condition of the solution. Extra thick deposits require it should be strong. When in need of purification this may be done by the use of ammonia alum; if the solution is acid, sufficient alum should be added to render it slightly alkaline.

Goods to be plated, if not new, should be stripped of all extraneous matter, and the surface be smoothed; burnishing, however, must be avoided, and the finishing done by the chemical process. Cast iron, if not tool finished, may have its glassy patches removed by hydro-fluoric acid. It is advisable to deposit the nickle slowly upon the cast iron. The goods on leaving the bath are washed in clean water. We may add that a thin deposit of nickel is more lasting and serviceable than a thick deposit, owing to the porous character of the metal. A deposit showing a dull surface on leaving the solution is more likely to stand well than one with a brilliant appearance. When deposited by the dynamo-electric machine, however, some of the best deposits present, on leaving the vat a bright surface. This is among the vagaries of electricity.

MANUFACTURES.

TO MACHINISTS, MANUFACTURERS AND OTHERS.

THE publishers of THE TRADE REVIEW solicit items of information concerning manufacturing and other establishments in any part of the country, and all such items will be promptly inserted in these columns, free of charge. Facts are the only things needed; and all communications should be accompanied with the name of the contributor—not for publication—but as a guarantee of good faith.

Manufacturers, machinist and engineers are particularly requested to communicate any matters of interest relating to their specialties. No one need be deterred from sending any interesting facts in his own language, as all such contributions will be properly revised before sending to press.

OHIO INDUSTRIES.

SARAH Furnace, near Morton, is running with coke, making car-wheel iron.

THE Smith Bridge Co., Toledo, has a number of large contracts on hand for bridges.

THE Summit Rubber Co., Akron, have begun a new industry, the manufacture of rubber pen holders.

SUMMERS Bros. & Co., expect to be turning out iron at their sheet mill in Struthers by the first of May.

THE Simms Automatic Car Co., of Columbus, has made an assignment to cover liabilities of $150,000.

THE Jefferson Iron Works propose putting in four additional nail machines, making a total of 102.

THE Morse Bridge Works, Youngstown, have a number of small bridges and several large ones to build.

G. W. LEOPARD has bought his partner's interest in the Leopard & Dujabahn Brick and Tile Works, Greensburg.

Two additional biscuit kilns will be erected by the Steubenville Pottery Company during the present or next month.

THE new "Ohio" tea pot of Knowles, Taylor & Knowles, East Liverpool, is now ready for the trade, and is in great demand.

THE Cleveland Bridge & Car Works in Cleveland, have a contract for 300 freight cars for the New York, West Shore & Buffalo road.

THE New York, Chicago and St. Louis Co. has secured a tract of 75 acres of land at Geneva, Lake County, and will build extensive shops there.

A COMPANY for the manufacture of glass has been formed at Meadville, and the capital all subscribed The works will be in operation inside of 60 days.

AT the new brick works of A. F. Bartges, Akron, a force of about 15 men will be employed. The outfit for the coming season has been placed at 2,000,000 brick.

W. O. TAYLOR & SONS, the enterprising chair manufacturers of Bedford, are contemplating the purchase of the Harmony Mills, Cuyahoga Falls, for a chair factory.

THE Cleveland Hardware Co., manufacturers of guide iron, wrought iron, wagon hardware, &c., are running night and day, and are full of orders. They employ 150 men.

A COMPANY composed of Mineral Ridge men has leased the Herring Farm, a mile west of Mineral Ridge, to quarry a twenty-foot vein of flagstone recently discovered.

MCNICOL, BURTON & Co., East Liverpool, are running full handed, and they are doing all they can attend to. Their books show more orders than they have had at any one time for a year, and more are coming in all the time.

MESSRS. La Tourette & Co., Middletown, are manufacturing an improved plug tobacco machine. It has a capacity of eight to fourteen thousand pounds per day, according to the thickness of the ribbon.

THE liabilities of the Akron Malleable Iron Works are stated at $13,000; assets, $9,000. The principal creditors are in Akron, Pittsburgh, Cleveland, Millersburg, Detroit, Jackson, O., and Warren—principally, however, in the first two named.

WEST, HARDWICK & Co., East Liverpool, have a good amount of orders on hand.

SAMUEL WOODHOUSE, 18th ward, Cleveland, manufacturer of all kinds of chains, is enjoying a flourishing trade.

THE Brilliant Glass Co.'s factory, Brilliant, has been completed, and work will be begun towards the end of next month.

THE Callwell & Collins Norway Bolt Company, Cleveland, are making foreign shipments of their products.

THE Columbus Machine Company, Columbus, are building a new blast engine for the Thomas Furnace Company of Niles.

R. WEDDLE'S mill, Salem, is comparatively a new enterprise, but is said to be doing a thriving business, and making a first-class success.

THE Baldwin mills, Niles, has been purchased by Hiram Ohl, who expects to make such improvements as are necessary for the production of good flour.

KNIGHT & KNAUFF, Diamond Fire Brick Company, 18th Ward, Cleveland, are having a rushing business. Having duly provided for it, they are well able to meet requirements.

MR. HENDERSON, late manager at Kansas City of the White Sewing Machine Company, is about to organize a new sewing machine company, to be located in Cleveland. An imposing building will be erected and supplied with machinery within six or eight months' time.

THE Whipple Mfg. Co., Cleveland, have completed their extensive works for the manufacture of Builder's Hardware, and are now in full operation. They have recently added to their assortment Butler's Adjustable Door Spring and Spring Hinges, and the Sterling Anti-Friction Barn Door Hanger.

THE Timms Automatic Car company, Columbus, with a paid-up capital of $100,000, made an assignment lately. Estimated assets, $260,000; liabilities, $150,000. The works have a capacity of 10 cars per day, and were ordered to be kept in operation. Insufficient capital is the reason given for the failure.

GRASSELLI Chemical Works, Broadway and Independence street, Cleveland, are running night and day. They employ 125 hands. Shipments are made all over the Union. The firm have all the business they can handle. They report margins much lower the past season than years before. The works were established in 1867.

THE Cincinnati, Hamilton & Dayton repairing shop, which was removed from Cincinnati to Delaware on the consolidation of that line with the C. C. & I. road, will in consequence of that consolidation not being confirmed by the court, be removed back to Cincinnati.

A. F. WRIGHT, corner of Broadway & Axtell street, Newburgh, manufacturer of tin and sheet iron work, who has carried on the business six years, states that he was fully occupied the past winter in filling orders, and anticipates a lively summer trade. He employs six hands.

WE have had the pleasure of being shown through the extensive establishment of Mr. Muehlhausen, wool puller, situate at No. 128 Columbus street. The building consists of two stories and a basement. The upper floor is used for drying wool and carrying stock; the second floor is used for finishing and wool pulling; the other floor is devoted to tanning, coloring, and washing wool and sheepskins. Mr. Muhelhausen has been established in the tanning business in Cleveland for 23 years. Shipments are made principally to Boston. The works are run by a forty-five horse power-engine.

OHIO Steel Barb Fence Company, occupy a two-story brick building, 5x150 feet, with a wing 50x50 feet, for manufacturing purposes, while a warehouse 50x100 feet, is used for storage. The officers of the company are: President, George W. Billings, Jr.; Secretary and Vice President, C. A. Billings; Superintendent, Frank Billings. Under the management of these gentlemen the organization has grown from small beginnings to wealth and a place in the first rank of manufactures. Seventy-five men are employed, and about 30 tons of fence produced daily. This is shipped to all parts of the Union.

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The King Iron Bridge and Manufacturing Company, Cleveland, employ 300 hands. Orders are plentiful. Amongst other undertakings the company is working on a 400-ton contract for the fine iron bridges on the Black Rock line of the New York, Lackawanna & Western, which, by the way, is another nickel plate road.

The Union Foundry Company, 17 East Main street, Cleveland, who make light castings and ornamental work a specialty, the former including stable fittings, have their resources tested to the utmost capacity and will evidently have their hands full through the season. They employ 110 men. They have a general shipping trade to Kentucky, Indiana, Michigan and Ohio. Their wages to employes, paid weekly, amount to $3,000 a month. The activity pervading their works shows that their resources are taxed to the utmost. They have several orders which they are about filling for parties in Texas.

East Liverpool: Vodrey Bros. are running full handed, and report trade moderately fair.——A. J. Bovce is now working on the machinery for Thompson & Co.'s pottery, and expects to have it completed by July 1st.——John F. Steele, Liverpool, is very busy, and at present has sixteen hands working steadily. He is drawing a kiln of ware every day.——At the Wedgwood Pottery of Wallace & Chetwynd everything is moving along nicely, and they will soon have their ware ready for the trade. ——Rodefer Bros., Bellaire, will commence the making of flint punch tumblers on March 27.—*American Pottery and Glassware Reporter.*

Buckeye Bridge and Boiler Works, Cleveland, have just completed and shipped eight spans for a bridge at East St. Louis. Two others are ready for shipment, one of which is sixty-two, the other ninety-two feet span. Several more are under contract. They are about to begin work on a stand pipe for the Mount Vernon Water Works. They have also a Water Tower to build for the Toledo Sporting Club, to be placed on Middle Bass Island. A boiler for the Brush Light and Power Co., of Cleveland, size 65x17, has just been completed by them, and they have orders for one for the Parkin Tide Company, of Cleveland, one for Roberts & Co., of Cleveland, and seven for the Atlantic and Pacific R. R. Co., besides other parties.

Warner & Swasey, Cleveland, designers and manufacturers of machine tools and special machinery, East Prospect street, near Euclid Avenue Station, and C. & P. R. R., are having a fine run of business. There are no articles in the line of machine work they do not supply. Among these they provide complete outfits of machinery with tools and fixtures, and guages, for the manufacture of brass goods. Shipments are made east and west. Large orders are just now being executed for parties in Massachusetts and Connecticut. The members of the firm, who are practical men, personally oversee every machine before sending out. Their buildings are three stories high and have a large frontage on the C. & P. R. R. Messrs. Warner & Swasey's shop is a model of neatness; their machinery is of the best improved kind. The firm employs thirty hands.

INDUSTRIES IN GENERAL.

The Pittsburgh Steel Casting Co. are building an extensive addition to their works.

The Prattle Governor Co. has been organized at Portland, Me., for manufacturing the Prattle steam engine governor. Capital $50,000.

The Dredging and Dock Co. of Chicago has been incorporated with $50,000 capital. O. B. Green, David Fales and Chas. R. Hough, incorporators.

The town of St. Albans, Vt., has voted to exempt the shops of the National Car Co. from taxation for ten years, provided they are erected at that place.

Hills & Jones, Wilmington, Del., manufacturers of special machinists' tools, especially for locomotive builders, have increased their capacity one-fourth.

Atterbury & Co., Pittsburgh, have made a new departure in the use of glass, a patent having recently been granted to them for the manufacture of glass shingles.

The New Hampshire Chemical Paper Co., located at Bristol, on a branch of the Northern Railroad, has a capital of $200,000, and has just got into operation, day and night.

The St. Louis Wire Fence Co. are adding new machinery.

A new "setting up" shop has just been completed by the Laconia (N. H.) Car Co.

The Rochester Barrel Machine Works, Rochester, N. Y., are carried on by John Greenwood & Co., and have achieved a high reputation for stove machinery.

A company with a large capital is being formed in Peterboro, Ont., for the purpose of starting a car factory. The town council has agreed to purchase $20,000 worth of stock.

The Shenandoah Valley Railroad Company has ordered one hundred additional freight cars, ten locomotives and ten passenger cars, in preparation for their increasing business next summer.

The Nashua Iron and Steel Co., Nashua, N. H., has forged a shaft for the steamer "City of Berlin," that measures 23½ inches in diameter and 39 inches diameter at the head. It is a creditable piece of work.

The Canada Tool Works, Montreal, have received an order for the complete outfit of machinery for the new car works at Kingston, Ont. This is the third order the company has on hand for new car works in Canada.

The Illinois Iron and Bolt Works, at Carpenterville, Ill., have removed their wood working department to a more commodious structure, in order to accommodate their growing business in locomotive tripods and carrying jacks.

The Polar Creek Coal and Iron Co. was organized recently, at Knoxville, Tenn. Capital, $1,000,000. Col. G. J. Forace, of Atlanta, president of Rayburn Gap and the Tennessee & Northwestern Railroads, was elected president.

The extensive forge of Wilson, Walker & Co., of Pittsburgh, produced, during the year 1881, 48,000 draw bars, 300 sets Miller hooks, 15,000 axles from new iron, and 1,500 tons links and pins. And this represents only a portion of their entire business.

A car wheel foundry is being built at Fargo, D. T., $100,000 having been subscribed. Mr. P. E. Mulcahy, president of the Elkhart (Ind.) car wheel works, will resign that position and manage the Fargo works, which are expected to be in operation by June 1st.

Two thousand new cars for the National Car Co. are being built by the Michigan Car Co., of Detroit, Mich., to be delivered at the rate of 250 a month, commencing April 15th. The company could not wait until its new shops are built before filling its orders.

The Standard Electrical Works and the Standard Brass Works have been incorporated in Kentucky, to be located between Covington and Ludlow. The incorporators are Messrs. Post & Co., railway supply merchants of Cincinnati. They expect to employ, in the new enterprise, at least 400 men.

Indiana is the leading State for car building, and has the largest car manufactory in the world. There are now in the State eight extensive manufactories at which cars are built, and, attached to four of them, are foundries, which cast the wheels and all other cast iron material used in their construction. These works give employment to 5,950 men, the Ohio Falls Cars Works leading, giving employment to 2,160 men.

The Peoria Pottery Co., Peoria, Ill., have just completed the addition to their extensive works, which cover over 200 feet square. Four new kilns, making eight in all, have been added, and the works have now a capacity of two car loads per day. The buildings cover about two acres, the improvements cost $40,000, and five miles of steam pipe for drying their materials is in position. They employ 150 persons.

Cavett & McKnight, foundry and machine shop, Pittsburgh, have built a vertical shear of 70 tons for the Pittsburg Steel Casting Company, the same as they made for the Siemens-Anderson Steel Co. They have just finished fitting up the steamer "Boaz" with new machinery. The "doctor" engine put on this steamer by C. & McK. is one of the finest on the river. This firm are adding another story to their building, and are putting in a lager crane for heavy castings.—*Pittsburgh American Manufacturer.*

An important industry at Lisbon, N. H., is that of Parker & Young, who are now doing a $50,000 business annually, in the manufacture of sounding boards, bridges, bars and rails for pianos; 20,000 sounding boards alone being manufactured last year. Canadian spruce is used for the boards, which go to the Eastern and Middle States, Canada, England and Germany.

The new Tack Plate Rolling Mill of Reed Bros., at Matfield, Mass., is now in successful operation. This mill covers an area of 7,200 square feet. The furnaces are built in the most thorough manner. As "tack place" iron is a specialty, no expense has been spared to render this mill capable of rolling a wide range of tack plates, and plates as thin as No. 22 can be rolled. The firm supply their tack works in Brockton with plates from this mill, also roll tack plate to order, and there manufacture all kinds of tacks, shoe nails and small nails. The firm will put in, at no distant day, additional furnaces, together with another train of rolls for the manufacture of bar iron. The mill works splendidly in every respect.—*Boston Com. Bulletin.*

Messrs. Samuel J Hadley & Son, Indianapolis, Ind., successors to Tyner & Hadley, have just issued a catalogue of Agricultural Implements and Farm Machinery. The Catalogue, which also contains a Farmer's Almanac, is replete with a varied fund of information to the farmer which would be difficult to obtain elsewhere. In it are illustrations of the most approved farm machinery for all seasons and purposes, inclusive of steam engines, saw mills, &c., with a full description of their working parts and advantages. The Catalogue containing nearly a hundred pages has been carefully compiled with a view of giving the greatest amount of information in the plainest and most concise manner, wholly avoiding technical phrases, which so often mislead and confuse. The catalogue is sent free on application.

Ancient Workings in the Copper District of Lake Superior.

The occurrence of copper was one of the objects that early attracted the attention of the Jesuits, and its presence, so frequently met with among the Indians, naturally excited their curiosity and wonder. Frequent mention of it is made, and in some instances the descriptions relate to masses of considerable size. But long prior to this period, the metal that attracted the attention of the missionaries and early voyageurs, and which now forms the basis of a great and growing industry, had been sought and mined for by a people who have left no record but the implements which they used and the excavations which they made. That this mining work is of a high antiquity is evident from many facts; the pits and tunnels which had been made had become filled up with rubbish and with decayed vegetation, and grown over with forest trees. There is scarcely a vein or outcrop of mineral in the whole copper district but the evidences are found of ancient workings, extending into the solid rock from a few feet to sixty feet in depth. Masses of copper of many ton's weight have thus been discovered surrounded with stone hammers in great numbers, pieces of burnt wood, and other evidences of former labor. The method of mining which these people apparently pursued was to heat the rock with the fire, and then by pouring on water and pounding the rock with their stone hammers to disintegrate and separate it. The copper tools found afford no identification of the race to whom they belonged.—*Houghton Mining Gazette.*

Construction of English Cotton Factories.—Keen competition and vast experience have led to great perfection in the construction of English cotton factories. The weaving sheds are built on the ground, are only one story in height, with glass roofs and stone or flag floors. Two advantages are claimed for this system of constructing these sheds: First. An even and fine light falls upon each loom. This is not the case in mills where weaving is carried on in buildings with one story above another, inasmuch as the looms near the windows have a good light, while those placed in the center of the room are not so well lighted, owing to the floor overhead. Second. The machinery, being placed on solid foundations, does not vibrate (or, at least or most, but little), thus securing a steady motion, and at the same time saving the machinery much "wear and tear"

The Bee Line are to enlarge their shops at Delaware.

STEAM HEATERS.

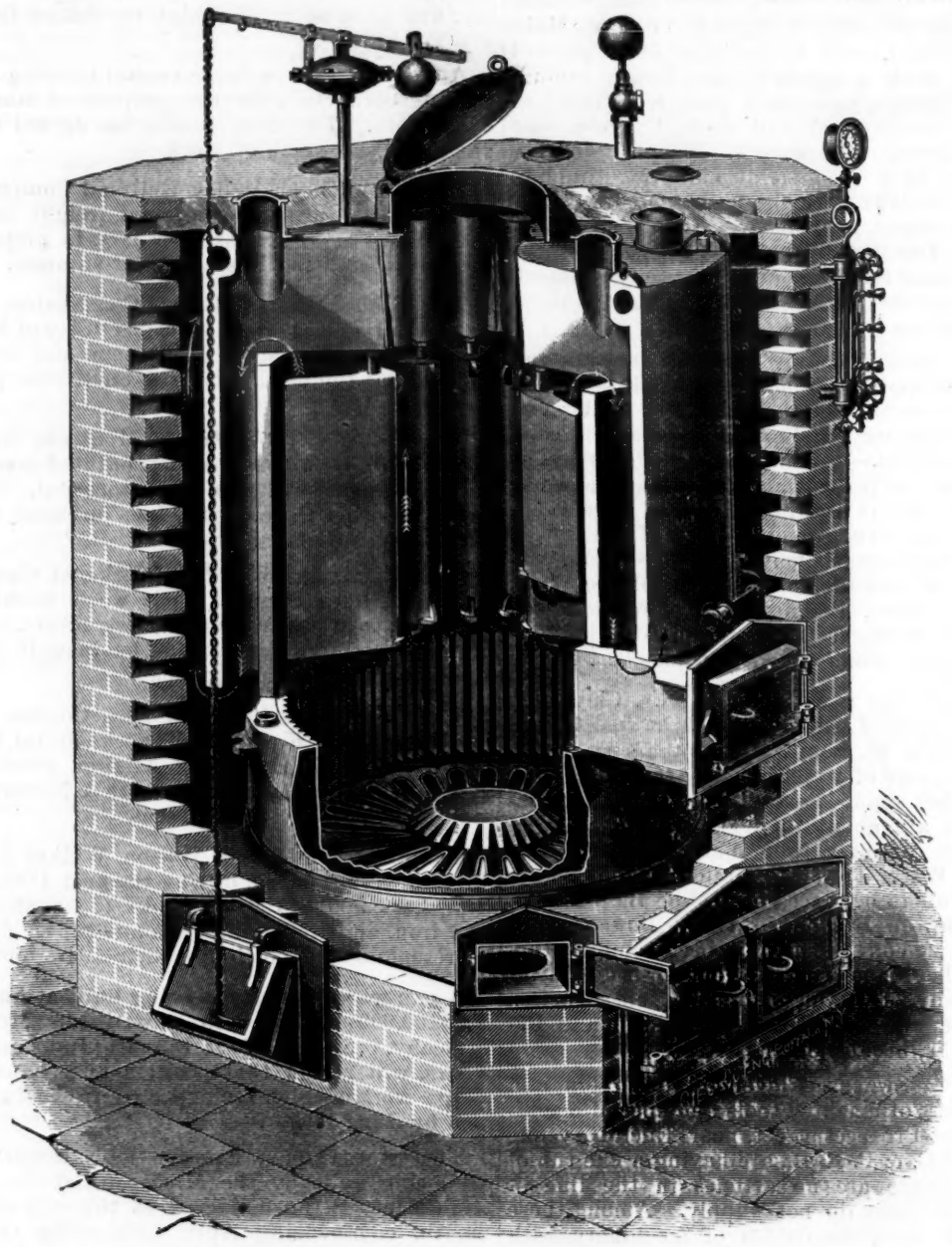
There are many grounds on which steam is to be preferred to closed or open fires for warming interiors. Steam has the clear advantage that it gives out to the atmosphere only heat, whereas stoves and open grates emit deleterious gases, and give forth a subtle dust to blend with the air. This is far from all that can be said in favor of steam heaters. They create the pleasantest temperature obtainable, a temperature, too, which can be regulated at will, and made to vary in different apartments of the same building; further, from any apartment connected with the conveying pipes, the heat can be shut off at will. The effect of breathing air thus heated, and left to its natural freshness, is exhilarating, favoring the exercise of physical power in the workshop, and warding off the languidness which comes from inhaling the poisoned and scorched air of an apartment in which direct combustion is carried on. Apart from benefit to health and the greater comfort afforded, a well devised steam heating system, as compared with stoves and open grates, secures a saving in a few years which renders the plant practically costless. Of late years this mode of heating has secured wide adoption in public and private buildings, and as time goes on we may anticipate steam heaters will be all but universally adopted. Healthful and economical, they heat single rooms or buildings with a uniformity which cannot be attained by any other means, a uniformity which, when the construction of the generator is on correct principles, will be maintained under all conditions. Steam heaters have been placed on the market which have failed to give satisfaction for various causes, many traceable to manufacturers unfamiliar with the needed requirements. Science and skill, however, in the hands of able mechanicians, have brought the steam heater to comparative perfection, and we feel we can do no greater service in this line than by directing attention to the Joy Steam Heater, manufactured by the Joy Steam Heating Company, Titusville, Pa.

We may premise that to hot-air furnaces there is a fatal objection, namely, that frequently the prevailing wind, or other counteracting influences, render it impossible at times to force the current to all parts of the building. Steam, with proper pipes and radiators, and with its volume maintained from a heater of proper capacity, does its work to perfection. For all this, the idea of steam is apt to create apprehension in some minds, as though danger necessarily lurked in it, whereas that circulating in the pipes and radiators is to be regarded as steam escaped, and on its way to find an outlet, becoming resolved into water as soon as heat is parted with.

The Joy Steam Heater, which is the result of five years of experiment and practical tests on the part of the makers, has the following advantages: The water capacity is sufficiently large to fill pipes and radiators with steam without so lowering the water in the boiler as to require an addition when steam is up. As the fire-pot is of iron, with a water space around it, no cinder forms and no repairs are required as in brick furnaces; and the fire-pot is of a depth to keep fire all night and thus keep up steam. The size and construction of the fire-box ensures perfect combustion. The flues and tubes being large and arranged in a vertical position, will not foul easily, and any deposit will fall. The heating surface is large in diameter, instead of in the direction of the chimney. The flues can be readily got at and cleaned; the grate is not only easily cleaned. but is so designed as to remove all possibility of its heating and cracking when heated, and, further, will allow of a new grate being promptly substituted. As the fore and draft doors are air-tight, thus damping the fore without obstructing the passage of gas, the chimney flues are unencumbered by tight dampers. The height of boiler allows its setting in the cellar without bringing the water line in boiler too near the level of main steam pipes. The temperature of the cellar is not appreciably increased by the presence of the generator, owing to its being inclosed in brick work, or a closely fitting galvanized iron jacket.

The external and interior view of the boiler furnishes a complete idea of the construction.

It may be considered the acme of constructive skill as securing economy of fuel, perfect arrangement for cleaning all fire surfaces, and safety in use. The boiler or heater being in sections, it can be readily handled, and promptly set up. The lower section of the boiler is an annular ring fire box, the inner surface of which is provided with vertical triangular projections. The fuel resting against the apex of the triangles is not liable to cinder, while a large increase of fire surface is thus obtained. Resting upon this base-section, and having direct water connection with it, are arranged the vertical sections, varying in number with the size of the boiler, from eight to ten. These sections are so placed that their deep grooves (a marked peculiarity of their construction), form return flues, each one of which has a fire surface equal to three boiler flues of two and a-half inches in diameter.



It will be seen by referring to our cut that the upper portion of each section has an inward radial projection, which, in combination, form an ample steam dome. It will also be noticed that semi-circular grooves in the sides of these projections form, in combination, circular openings directly over the flues to facilitate the cleaning of the same. Immediately above the fire are V-shaped tubes, or generators, having upper and lower connections with each section, thus affording free and ample circulation of steam and water. The peculiar form of these generators gives a large amount of heating service, while their location within the combustion chamber secures the very best results. The Joy Steam Heater may be constructed to heat a single room, or the largest building. The experience and judgment of the manufacturers is of service in determining the amount of radiation required for a given space, depending as it does not only on the space, but other ever-varying conditions.

Testimonials from owners of manufactories, hotels and private buildings, advert to the admirable way in which the Joy Steam Heater has performed its part, providing a temperature even in the coldest weather as genial as summer, whilst in milder weather the heat can be tempered as they choose. Dealers recommend the Joy Steam Heater on the ground not only of the little trouble it gives, and the certainty of its action, but that the direct heating surface of the boiler in reference to grate surface largely exceeds any other.

Trade and Commerce.

There continues to be a favorable condition of the money markets, for prosperity in general business, both at home and abroad. In Europe the French panic has apparently had a salutary effect, by causing a greater degree of caution in speculative ventures, and the result is that the leading monetary institutions have gained largely in specie and have become strong enough to lead freely at lower rates of discount than before. Good European securities which were depressed in price have been bought up, until they have advanced, and become scarce on the markets, and this has caused a demand for United States securities, so that purchases have been made in New York to an extent sufficient to give a supply of foreign exchange equal to the demand, and caused rates of the latter to decline below the point warranting the shipment of specie to Europe. As long as this demand for securities continues we will not be drained of our gold, and the demand is likely to continue for some time. Our imports and exports of commodities so nearly balance each other, now that the movement of securities holds the balance of power in regard to specie shipments; a war cloud in Europe might send them home, but at present the political horizon there has no such clouds as portend an immediate storm. Our net exports of gold since January 1st have been little over the average production of our mines for a similar length of time, so that our currency has about as strong a basis as ever, and as money is returning from the country to the monetary centers the money markets are becoming easier. The Stock Exchange in New York shows the effect of the improved condition in monetary affairs by an advance in prices all along the line. The rapid reduction in the public debt sets free money which has to seek other investment, and, as a rule, this creates an increased demand for first-class securities, which consequently command very full prices, and even the lower grades of securities are favorably affected by it. The greater ease in the money markets also affect speculation in produce which, however, is modified by various other influences,

but still the general tendency has been to a higher level of value in cotton, breadstuffs, provisions, etc. So that the influence is to restrict foreign exports of these commodities by carrying prices above their party in the foreign markets. In the more legitimate branches of trade such as manufactures and the distribution of supplies to the country there is considerable activity, although in some quarters business is restricted by the calamitous inundations, and the continuous rains which keep the roads in an impracticable condition.—*Cincinnati Price Current.*

About Crows.—Professor Linden said a good word the other day at Buffalo for that much persecuted bird, the common crow, (Corvus Americanus). The crow of America belongs to a scattered family of about 200 species, including among them the buzzard, jay, raven and magpie. Of the genus proper to which the crow belongs, seven examples are found in the United States, the great black raven being at the head. In the wilderness about 100 miles from Buffalo, on the shores of Lake Ontario, ravens were found. Their nests were so secluded as rarely to be discovered. So wary were the birds that Mr. Linden had found it impossible to obtain a specimen. They were reported more abundant on the Canada shore of Lake Ontario but it was impossible to procure a specimen even there, though a liberal reward had been offered. The crow was only preserved from annihilation by its great cunning. Even in capacity the bird displays a degree of sagacity which almost resembles human intelligence. Mr. Linden admitted that the crow could hardly be called a sweet singer; still when tamed he made a very interesting pet. On the whole, he might safely be set down as a useful bird and a real friend of the farmer. He eats large quantities of noxious insects, and though he has a bad habit of pulling up young tender shoots of grain, it was a question whether the damage was not more than compensated by the number of larvæ of beetles thus brought to light and devoured.

Novel Heliometers.—At a recent meeting of the Royal Dublin Society, Howard Grubb described some novel heliometers which are at present in process of construction in Dublin for the Belgian Government, to be used at the coming transit of Venus, the design of Professor Houzeau, the Belgian Astronomer-Royal. A heliometer is generally made from a single objective, cut in two, with mechanical arrangements for traversing one-half wtth respect to the other. In Professor Houzeau's arrangement the two half-objectives are of very different foci—one of about fourteen feet, the other six inches only, but so placed that both form their image on the same plane. As the apparent diameters of Venus and the sun are about as twenty-eight to one, it follows that the image of Venus, as formed by the large objective, will be about the same size as that of the sun formed by the small objective, and consequently coincidences can be made, not by bringing the limb of Venus to touch that of the sun, or a micrometer line, but by superposing the image of the sun as formed by the small objective on the very slightly larger image of Venus, as formed by the large objective, and thus it is hoped that all the inconvenient and perplexing phenomena of irradiation, "black drop," etc., will be completely eliminated.

Mucilage for Pasteboard.—Person are often at a loss for a very strong mucilage, having sufficient power of tenacity to fasten sheets of pasteboard together. The following cement is recommended by a scientific authority. It has the additional advantage of being waterproof. Melt together equal parts of pitch and gutta percha. To nine parts of this add three parts of boiled oil and one-fifth part of litharge. Continue the heat with stirring until a thorough union of the ingredients is effected Apply the mixture hot or somewhat cooled, and thinned with a small quantity of benzole or turpentine oil.

The Nation's Characteristics.

Shrewdness and incredulity are the predominant characteristics of the American people. They will take no stock in an article unless it is meritorious. When Dr. Swayne launched his Ointment for the Piles, that itch so intensely at night, on a sea of human suffering, the physicians laughed, but the people tried it all the same and manifested their approbation in a National endorsement. Now the allopaths and homeopaths are laughing the other way. This world is full of reverses.

MISCELLANEOUS RECEIPTS.

To Close Cracks in a Stove.—A good cement to close the cracks in a cast-iron stove can be made of wood ashes, sifted very fine, mixed with an equal quantity of pulverized clay and a little salt. Moisten with water to make a paste, and fill the cracks when the iron is cold. The cement will not scale nor break, and becomes very hard after heating. It is also good to fill the joints in stove pipes when they are required to be tight.

To Make a Waterproof Varnish.—Take four ounces clear gutta percha dissolved in one pound of rectified resin oil; add two pounds of linseed oil varnish, boiling hot.

Whetstones.—Use kerosene oil on whetstones. It keeps the stone in good condition and assists the operation of sharpening.

To Clean Polished Marble.—The *English Mechanic* gives the following recipes: Polished marble when soiled may be cleaned with a weak lye of potash and soft soap. Muriatic acid is the best thing for removing iron stains; it should be applied with a rag, but if used too freely or too strong will make the surface rough. The following is the best recipe for removing ordinary stains from ivory or marble: Dust lime is mixed with the strongest soap-lye pretty thick, and instantly with a painter's brush, laid on the whole of the marble. In two months' time wash it off perfectly clean, then have ready a fine, thick lather of soap (soft) boiled in soft water; dip a brush in it and scour the marble, not with powder, as in common cleaning. This will, by very good rubbing, give a very good polish. Clear off the soap, and finish with a smooth, hard brush till the end be effected.

Molded Ornaments.—For molded ornaments for patterns for stoves, vases, etc., the following composition is commonly used: Soften 12lb. of good glue in water enough to cover it, then heat until the glue is dissolved. Melt 7lb. of resin, ½ lb. of pitch, and 2½ pints of linseed oil together. Stir the hot glue solution into this and add enough whiting to thicken. It should be mixed in small quantities and used at once; otherwise it will require steaming before it can be used.

To Bore Wooden Handles.—The best plan is to have two or three floats or taper files cut on one side and one edge only with a few coarse teeth, and one or all made to cut backwards, for getting out the holes to suit the different dimensions of tangs. Almost any old tool that is small enough will do to make them of, and the notches may be and are better for being as uneven as you please; and the tool need not be hardened, or if hardened should be lowered to saw temper so that you can easily sharpen it with a file. The best wood for handles is ash, as it does not blister the hands. It must be well seasoned or the ferrules will drop off, and a dressing of linseed oil and yellow ocher, with alkanet root to give a red tinge, should be smeared on and allowed to dry on for a day or two before giving the finishing rub off.

Nitric Acid.—This is one of the most important chemical agencies employed in the arts and manufacturing; agencies due to the property which it possesses of yielding very freely a notable proportion of its oxygen to substances having an affinity for the same, a property which renders it one of the most energetic of oxidizing agents. On this account, as well as because of its cheapness, its use for oxidizing purposes in the laboratory is very extensive.

Its property of energetically dissolving many of the common metals, renders it useful in etching steel, copper, bronze and the like. In the manufacture of sulphuric acid, it is introduced for the purpose of effecting the oxidation of the sulphurous acid given off in the burning of sulphur, or roasting of pyrites, to sulphuric acid. It has the property of yielding, with certain organic substances, what are called nitro-compounds, which are of great value in the arts. So, for example, nitro-cellulose (gun-cotton), nitro-glycerine, nitro-benzole, nitro-mannite, and a number of analogous products are found. Owing to its powerful oxidizing action, it acts powerfully upon coloring matters, and on this account has some important application in dyeing. By prolonged treatment with nitric acid, starch, cellulose (wood fibre), and sugar are converted into oxalid acid; very dilute acid converts starch into dextrine.

Ironwork in Architecture.

At a recent meeting of the Institute of British Architects, Mr. H. Stannus read a paper on the artistic treatment of ironwork in architectural construction. Ironwork, he regretted to say, had not been fairly treated, either by its friends or by its critics. Mr. Ruskin, among the latter, declared that "true architecture does not admit iron as a constructive material." Generally it has been spurned as unarchitectural, wanting in bulk and monumental effect, as neither suiting any historic style, nor having one of its own. It was, however, he considered, bad logic to condemn a material which they had not as yet become used to. It was unfair, too, to expect from so new a material as iron a perfect style of its own, considering that the Greek Doric took a long time to grow to maturity. At present the use of iron was under the ban of negative laws. In the first place it should not be so designed as to imitate the characteristic forms of dissimilar materials, such as wood and stone. Forms produced by under-cut carving like the Corinthian and early English capitals should not be aped in iron, which could not rival their exquisite beauty. There were one or two other prohibitions which might be summarized in the general law that in all mechanical repetitions the forms should be conventionalized. In favor of cast iron, however, they had modelled surface, giving richness and hiding inequality; cheapness when there was a repetition of the same factors, largeness of pieces, easy renewal of parts, and beauty of perforation when seen against the sky or light. The disadvantages were rust and deterioration, the "strip" incident to molding in sand; and the difficulties of making bolts and joints. Similar advantages and disadvantages attended the use of wrought iron. It was, however, his belief that if the forms were deduced logically from the difficulties of the material, there was a great future before iron architecture. A discussion followed, in which Mr. Jennings also advocated the use of iron in decorative art, but did not expect to see it brought into use until metallurgic science had discovered some means of preventing the metal oxidising. Mr. Blomfield thought hammered iron might be used with effect in the composition of the Corinthian capital. He also referred to the success with which the old Spanish architects made use of it in their buildings. Mr. J. R. Sheddon took a different view, and thought that architects who studied beauty should leave iron altogether in the hands of the engineers, who only studied strength. The thanks of the Institute were passed to Mr. Stannus for his paper.

What Is the Glossograph?—It is an instrument invented by A. Gentillii of Vienna. What are the peculiarities of the glossograph? It has a combination of delicate levers and blades, which, being placed upon the tongue and lips and under the nostrils of a speaker, are vibrated by the movements of the former and the breath flowing from the latter. This vibration is transmitted to pencils. These transcribe the several signs produced by the action of the tongue and lips and the breath from the nostrils upon a strip of paper moved by a mechanical arrangement, and thus a special system of writing, which may be termed glossography, is produced. This is based upon the principle of syllable construction and combination of consonants. The orator has only to breathe his eloquence personally through the glossograph, or hire somebody to do it for him. This invention might fill the world with joy if the average speech of modern times were only better worth reporting. With all the ingenuity of the age, nobody has yet discovered an arrangement by which the gentlemen who have nothing to say may be kept silent. Such a machine would be well worth, not only a patent, but a money appropriation.

Strengthening of Boilers.—One danger with boilers is the tearing away of seams, but a method of which we are inclined to think favorably, suggested by an English engineer, would dispense with riveting. In making this boiler a ring of steel is cast and heated; then it is placed upon a large roller, and by the aid of smaller rollers, it is enlarged to the requisite dimensions. The ring is run from one end of the roller to the other, and is returned by reversing the machinery. The heads necessary for the completion of the boiler are subsequently put on with bolts. A boiler of this description has been exhibited.

TRADE AND COMMERCE.

Our Trade with Mexico.

Consul Turner, at La Paz, Mexico, writes very discouragingly of the policy pursued as to the foreign trade. After enumerating a number of additional duties imposed, he says: "The tonnage dues of vessels have been raised and considerable additions made to the port charges on all vessels from foreign ports. As there is no industry in the country to protect, all these additional duties are so many additional charges on the consumers. The condition of the working class is rendered insupportable, and they are leaving Lower California in large numbers, in search of some place where they can live cheaper. What bears the heaviest on the prosperity of the country are the duties on coal, lumber and machinery. There are three lumber-yards in La Paz, all with very light stocks on hand on which they have raised the price nearly 100 per cent., and when these stocks are exhausted I do not know what will be done, as neither of the yards will import lumber under the existing law. It is impossible to manifest it as the law requires, and none of the importers feel like running the risk of fines and imprisonment. These duties will undoubtedly have a disastrous effect upon the industry and prosperity of the country, and I understand that already a number of projected mining enterprises have been abandoned on account of them. The rulers of Mexico have, no doubt, gained large sums of money by their railroad and other concessions, and they should not now legislate to render these concessions valueless. The policy, if there is a policy, seems to be to prevent the introduction of American capital and people, to keep the people of Mexico in abject poverty, so that they may be the more easily managed and the power retained in the hands of the present rulers, to prevent anything in the shape of improvement of the present miserable condition of the people and country, and I fear that nothing good for Mexico or for the United States is to be hoped for until a more liberal spirit prevails."

The Flour Trade.

The tone of the flour market has somewhat improved since our last issue, though not as much as might be wished. The fact is, just at present, there's plenty of room for improvement in the flour market, and comparatively little tendency in that direction. One feature which injuriously affects the market is the presence of quantities of "patents" which are only so in name, and being unsound and unreliable. These it would be difficult to sell in any condition of the market, but the sound patents and choice Minnesota clears and straights will sell for more money rather than less. They are at present firmly held, as holders feel confident that stocks cannot be replaced at present prices, if, indeed, they can be at any prices. All brands concerning whose keeping qualities there is any doubt, will probably be more pressed for sale as the warm weather approaches. Winter patents have been pretty well sustained, though winter wheat flour is none of it now held at prices which will leave the miller any profit. Low grades are plentiful, and sell at very low prices. The European demand has not improved perceptibly, but there has been a slightly better movement for the tropical markets. Stocks at the principal markets are still increasing, especially of the lowest grades and low spring patents.—Milling World.

Australian Gold Shipment to the United States.

The shipment of gold from Australia to San Francisco, in considerable quantities the past few months, shows a departure from the former channels of dispersion of the precious metal, and the subject is attracting some attention both in England and her colonies. To the former it is not without considerable significance as an indication of an important check at the chief source whence it obtains its supplies of bullion, and any curtailment of the stream to the London mint has the same effect on the value of money as an increased foreign demand for gold, unless some compensating movement in another direction should adjust the balance. To the colonies, however, this change in the direction of Australian gold remittances is only of interest so far as it illustrates the familiar principle of commerce, that all commodities tend to find their way to the point of consumption by the most direct route. Bankers are not slow to discover the route that is the most remunerative or least expensive to them, and they would not patronize the American route, unless they found that bullion could be profitably converted in the United States into London exchange. For many years back the purchase of bills on London in New York could only be effected at a premium, and a shipper of Australian gold to America would have found himself out of pocket by the attempt to make it available in England by that process. Now, however, the conditions are reversed. The extraordinary importation of American wheat and cotton during the last two years into England has revolutionized the monetary relations, and British exchange is obtainable at a discount. Hence the shipments of gold from Australia to this country.

Our Imports of Iron and Steel in 1881.

The total value of our imports of iron and steel in 1881 was $61,555,078, against $80,443,362 in 1880. This shows a decrease of very nearly 25 per cent. in our iron and steel imports, which is not so great a decrease as was confidently anticipated at the beginning of 1881. The decrease was in our imports of pig iron, bar iron, band iron, sheet iron, scrap iron, hardware and miscellaneous manufactures, the greatest falling off being in scrap iron. There was an increased importation in 1881 of castings, boiler iron, iron rails, steel rails, tin-plates, anchors and chains, machinery, fire-arms, steel ingots and other forms of steel, cutlery, files, saws and tools, the greatest increase in quantity being in steel rails, and the greatest increase in value being in steel ingots and other forms of steel. The increase in the imports of steel ingots, etc., was very nearly 80 per cent., which was due to the heavy importations of steel blooms; they are not separately classed, and we are not able to give their weight. The British Board of Trade returns for 1881, however, report that in that year 135,275 gross tons of "unwrought steel" were shipped to the United States, of which almost all was steel blooms. An unknown quantity of steel blooms was also imported from Germany.—[Bulletin of American Iron and Steel Association.

MECHANICAL RECEIPTS AND ITEMS.

Silvering Iron.

A manufacturer in Vienna employs the following process for silvering iron: He first covers the iron with mercury, and silvers by the galvanic process. By heating to 300° C., the mercury evaporates and the silver layer is fixed. Ironware is first heated with diluted hydrochloric acid, and then dipped in a solution of nitrate of mercury, being at the same time in communication with the zinc pole of an electric battery, a piece of gas carbon or platinum being used as an anode for the other pole. The metal is soon covered with a layer of quicksilver, is then taken out and well washed and silvered in a silver solution. To save silver the ware can be first covered with a layer of tin; one part of cream of tartar is dissolved in eight parts of boiling water, and one or more tin anodes are joined with the carbon pole of a Bunsen element. The zinc pole communicates with a well-cleaned piece of copper, and the battery is made to act till enough tin has deposited on the copper, when this is taken out and the ironware put in its place. The ware thus covered with tin chemically pure and silvered is much cheaper than any other silvered metals.

To Tin Cast Iron.

Make bath of one pint of muriatic acid, add twelve pints of water for a pickle, and put the castings to be tinned in them and let them remain long enough to clean them; then dry and dip them into the melted tin, which does not require to be very hot. Put unrendered beef tallow on top of tin; it keeps the scum back, and then dip the castings in the tin long enough to make the tin stick to the castings. Castings look better to be put in an oven, and it will melt the tin off where it does not tin evenly.

Friction in Steam Engines.

A large portion of the friction of engines is the result of tight cylinder packing. In setting out packing it should be only tight enough to keep the steam from passing. It is best to do this job by degrees, setting out the rings a little and then blocking the crosshead, and testing by allowing steam in the crane end of the cylinder. When no steam passes, the rings are tight enough. In cylinders that have run for some time it is impossible to make a piston tight without reboring. Care should also be exercised in making a complete revolution of the engine by hand after setting out the rings, to see that the packing does not stick in any of the smaller portions of the cylinder. An engine that requires constant lubrication in the cylinder to prevent "squeaking," needs attention, as generally the rings will be found too tight, or the cylinder out of line.

Comparative Value of Steam Engines.

Hallauer's recent experiments have led him to the conclusion that the difference between engines of one and two cylinders, in point of economy, is very slight. In ranging from 80 to 8,000 horse-power, with revolutions varying from 25 to 90 per minute, the expenditure of steam for a given amount of work remains the same for the same type of motor; the consumption for two cylinder motors are identical, whatever their size, if the motors are regulated so as to give the maximum efficiency; the expenditures of steam in motors of one, two and three cylinders, suitably regulated and constructed, are so nearly alike that the choice may be governed in each instance merely by the fitness of the type of the engine for the particular purpose desired.

Black Ground for Japanning.

A good black ground for japanning is prepared by grinding fine ivory black with a sufficient quantity of alcoholic shellac varnish on a stone slab with a muller, until a perfectly smooth black varnish is obtained. If other colors are required, the clear varnish is mixed and ground with the proper quantity of suitable pigments in a similar manner. The following are good common black grounds: 1. Asphaltum, 1 lb.; balsam capavi, 1 lb.; oil of turpentine, q. s. The asphaltum is melted over a fire, and the balsam, previously heated, is mixed in with it. The mixture is then removed from fire and mixed with turpentine. 2. Moisten good lampblack with oil of turpentine, and grind it very fine with a muller on a stone plate; then add a sufficient quantity of ordinary copal varnish, and rub well together. 3. Asphaltum, 3 oz.; boiled oil, 4 quarts; burnt umber, 8 oz.; oil of turpentine, q. s. Melt the asphaltum, stir in the oil, previously heated, then the umber, and when cooling thin down with the oil of turpentine. An extra black is prepared from—amber, 12 oz.; asphaltum, purified, 2 oz.; boiled oil, ½ pint; resin, 2 oz.; oil of turpentine, 16 oz. Fuse the gum and resin and asphaltum, add the hot oil, stir well together, and, when cooling, add the turpentine. A white ground is prepared from copal varnish and zinc white of starch. From one to six or more coats of varnish are applied to the work in japanning, each coat being hardened in the oven before the next is put on. The last coat in colored work is usually of clear varnish.

Cored Steel Axles.

Objections have been taken by some to homogeneous steel axles, says the English technical journal, Iron, on the score of their liability to break suddenly and without warning. In order to meet this objection a cored steel axle has been patented, and is now manufactured in England. The axle is formed by casting a steel ingot around a core of fibrous wrought iron, which, under the subsequent hammering or rolling of the ingot, is elongated along with the steel, forming a central core of wrought iron the whole length of the axle. The result is a very close practical approach to the principle of a hollow railway axle. The continuity of the axle being broken by the interposition of another ductile material, any fracture taking place will be confined to the outer or less ductile material, and the complete rupture of the axle into two or more disconnected parts is avoided.

In principle, a central hole, whose diameter is 42 per cent. of the diameter of the axles, weakens transversely the axle by only three per cent., because the central hole lies around the neutral axis. Now, if this central hole be filled up by a tough core of wrought iron, the tubular outer steel axle is comparatively free to become oval or deformed, without having that tendency to snap across; and should the tube finally be broken quite across, the wrought iron core acts as a tie-rod, preventing the complete separation of the parts. This kind of axle has been repeatedly tested, and the correctness of the above remarks has been confirmed; the outer coating of steel has been purposely deeply nicked, and the testing then has been continued to destruction, proving that the cored steel axle stands with safety much more than any other kind of axle of equal size. Besides the consideration of mere transverse strength, the wear of the journals of the axle may be counteracted by using a rather hard steel for the envelope. The solid steel axles, which of necessity must be made of a very mild steel, are liable to much wear in the journals.

MANUFACTURERS' PROFITS.—Martineau & Smith's Hardware Journal, published at Birmingham, England, says: Some tallish stories are being told at present of the profits made in Birmingham. A local firm engaged in the steel and kindred trades must have done remarkably well during the past twelve months, if it be true, as stated, that one of the partners has declared he will be disappointed if his profits do not touch 20,000 pounds sterling. I have been told that another firm, after getting out their balance-sheet for the year, presented their head steel-melter with a cheque for 120 pounds sterling, by way of bonus in recognition of the share he had had in his employers' prosperity. A Sheffield manufacturer, who has long since made his fortune—and spent many thousand pounds in philanthropic objects still keeps at the wheel of business and adds to his goodly pile. A few days ago he gave to each of his daughters (several of whom are married) a sum of 10,000 pounds sterling, and presented his son with gifts which were equivalent to 37,000 pounds sterling. Again, a manufacturer and merchant, of Sheffield, is stated to have recently purchased a splendid estate in Staffordshire.

THE practical $5 Standard Electric Belt advertised in this paper should not be confounded with other electric goods.

RAILROADS AND TRAFFIC.

The Pennsylvania Railroad Company has just spent $500,000 in cutting a straight path through the rocky Palisades, which let them down into Jersey City, and they are going to spend $2,000,000 in cutting a straight road from their ferry to the Palisades, and being rid of the annoyance of passing at low grade through Jersey City.

The Lima & Columbus, O., a new road, is projected to run from Lima, Ohio, through the counties of Warsaw, Waynesfield, Round Head, Belle Center, Rushsylvania, West Marysville and Dublin to Columbus.

Mr. Jewett is quietly working to install a board of directors at the next annual meeting of the Cleveland, Columbus, Cincinnati & Indianapolis, which shall be of the Erie's selection. The control of the Cleveland, Columbus, Cincinnati & Indianapolis carries with it the control of the Indianapolis & St. Louis road, and 9,100 shares of the stock of the Cincinnati, Hamilton & Dayton company which, with the stock held by individuals friendly to Jewett, will give him the Cincinnati, Hamilton & Dayton, and leased lines also. It is understood that if the Erie company is successful in obtaining control of these lines, it will push the construction of the Atlantic & Chicago from Marion, Ohio, to Berea Junction and Chicago as fast as possible. The bonds of this road to the amount of $6,000,000, are guaranteed by the Erie company, under an agreement by which it will have a thorough line under its own management from New York to Chicago.

The block means of signalling is by no means an infallible preventive of railway accidents, excellent as it is. The London Engineer notes three recent cases of failure, one caused by mistake of signalman, one by fog, and one by inability to indicate danger on more than one track at a time.

The evil results of the fierce competition in passenger fares among the roads between Chicago, St. Louis and Kansas City, during which one company issued an enormous number of unlimited tickets, still continue to be felt and provoke new disturbance.

A bill has been introduced into the Ohio Senate which provides that where railroads cross each other at common grades the companies shall provide such works or fixtures as to render it safe to pass over the crossing without stopping, the appliances to be first approved by the commissioner of railroads. Should the commissioner fail to approve the plan proposed, the railway companies can appeal to the County Common Pleas Court for right to erect such appliances as they see fit.

The subscribers' committee, which investigated the affairs of the Toledo, Cincinnati & St. Louis railroad, found a half million more assets than expected.

The Atchison, Topeka and Santa Fe Railroad Company, and the Southern Pacific Railroad Company, have effected a compromise by which the Atlantic & Pacific Road is to be completed this year to the Colorado River, and the Southern Pacific Company will build to meet it.

The work of dividing the percentages on east bound traffic among the roads leading out of Chicago have not yet been accomplished. As, however, all the roads have agreed to date back the division to March 13 there is no immediate haste in fixing the percentages.

The plan of the directors of the Connotton Valley to relieve this Company from its embarrassments is as follows: They propose briefly to substitute for the present issues of bonds a new issue of $7,000,000, to bear 5 per cent. interest for three years and 6 per cent. thereafter. Of these bonds $2,600,000 will be issued in place of the Connotton Valley first-mortgage bonds and $2,150,000 in place of the Connotton Valley & Straitsville bonds. To Connotton Valley bondholders it is proposed to give also new preferred stock to the amount of 35 per cent. of their bonds, as a consideration for the reduced rate of interest. On making the exchange the bondholders will be asked to take an additional $987,500 of the new bonds at par, which will give the company monev to clear off its floating debts, put the road in good order for business aud meet all pressing needs. There will still remain $1,262,500 of the new bonds to be used in building the Straitsville Extension.

The track of the Northern Pacific Railroad is now down in the Yellowstone Valley to a point 125 miles west of Glendire, and twenty miles beyond the mouth of the Little Rosebud. The open window has been very favorable for work, and grading and track-laying have scarcely been interrupted. Ninety miles of track have been laid in the Yellow Stone Valley during the winter months. West of the present terminus there are forty miles graded and ready for the rails. Coulson, 225 miles west of Glendire, will be reached in June, and Bozeman, at the Eastern slope of the Rocky Mountains by September. There will then be over 1,000 miles of completed track on this side of the mountains.

The Syndicate controlling $2,200,000 of the Atlantic & Pacific subscriptions, is said to have refused ten per cent. premium for the amount.

The bill recently introduced in the House of Representatives at Washington by Mr. Converse, of Ohio, to prohibit the consolidation of railroad companies, and for other purposes, is as follows: It shall be unlawful for any railroad company for the construction of whose road the United States have granted lands, right of way, franchise, or any other thing of valne, to consolidate its line with any other parallel or competing line of road or roads, or with any parallel or competing line of boats or water transportation, either by act of consolidation, purchase, lease, running contract, or otherwise; and it shall furthermore be unlawful for any railroad or navigation company, over which the United States may rightfully and constitutionally exercise legislative jurisdiction and control, to make any arrangement or agreement which shall in any respect prevent or prohibit competition in freight and passenger traffic.

Flint Fire Bricks.

A new process of manufacturing fire bricks has been invented abroad. It is as follows: The flint stones are first thoroughly calcined in special furnaces constructed for the purpose. The calcined flint is then transferred to a fixed pan in which revolves a pair of heavy edge-runners. The limestone is also burned in a kiln in the usual manner and deposited in a tank, into which water is introduced, and the burnt lime is there partially dissolved. The water, in which the lime has been partially dissolved, is run into another tank, and there allowed fo settle, and a proportion of the lime deposits at the bottom of the tank. The lime water is conveyed by pipes to the pan of the edge-runners in which the flint has been deposited, enough lime water being introduced to moisten the flint sufficiently for a thorough mixing. The revolving runners grind and thoroughly mix the mass, taking about a quarter of an hour for each charge of one ton of flint and lime water. When the mass has been ground and mixed sufficiently for the purpose for which it is intended, it is removed from the pan through a sluice in the bottom. The plastic composition thus formed may at once be molded into brick, but it is improved and brought to a better temper by being kept for a few hours before molding, which plan is usually adopted. The molding, drying and baking processes are effected in the manner usual in the manufacture of stone fire-bricks generally. The fire-cement is brought into fit condition for sale by drying the plastic compound after it leaves the pan, and grinding it when dry. It is then ready to be packed in bags or casks for the market. By this method of manufacture, fire goods are produced which consist of nearly pure silica, and which are capable of resisting the intensest heat. This manufacture is interesting and important, as showing how a material which exists in great abundance in Ohio, and hitherto of little value in the industrial arts, may be turned to good account in producing a fire-brick of unexceptionable quality.

Heat.—Heat is a peculiar motion of the particles of matter which prevents their contact. Heat and mechanical power are convertible forces. The force of the heat that raises one pound of water 1° F. will lift a weight of 772 lbs. one foot high. The power of a weight of 772 lbs. descending one foot, if applied to a small paddle wheel turning in one pound of water, will, by friction, raise the temperature of the water 1° F. A heat unit is the amount of heat that raises a pound of water 1° F., or that lifts a weight of 772 lbs. one foot high. The mechanical equivalent of a heat-unit is the power of a weight of 772 lbs. descending one foot, or of a one-pound weight descending 772 feet. Hence, 772 foot-pounds equals 1 heat-unit, and 1 heat-unit 772 foot-pounds. A galvanic battery that produces an electrical current capable of heating one pound of water 1° F., will yield magnetic force sufficient to raise a weight of 772 lbs. one foot high. Thus heat, electricity, magnetism and chemical force are brought into numerical correlation with mechanical power. The illustrious philosopher, Dr. J. P. Joule, of Manchester, England, first promulgated the mechanical equivalent of heat, A. D. 1845.

A $20.00 Biblical Reward.—The publishers of Rutledge's Monthly offer ten valuable rewards in their Monthly for April, among which is the following: We will give $20.00 in gold to the person telling us which is the middle verse in the New Testament Scriptures by April 10, 1883. Should two or more correct answers be received the reward will be divided. The money will be forwarded to the winner April 15th, 1882. Persons trying for the reward must send 20 cents in silver (no postage stamps taken) with their answer, for which they will receive the May Monthly, in which the name and address of the winner of the reward and the correct answer will be published. This may be worth $20.00 to you; cut it out. Address—Rutledge Publishing Company, Easton, Penna.

Mechanical Terms.

The technical terms which are in use do not seem to be generally comprehended by the majority of our mechanics and engineers, from the fact that a large number of terms are in use which mean one and the same thing. The distinction particularly between the terms force, power and work, is not clearly understood. Dynamics is the science of that branch of mechanics which treats of force in motion, power and work. It comprehends the action of all kinds of machinery, manual and animal labor, in transformation of physical work. Element is an essential principal which cannot be resolved into two or more different principles. The simple physical elements of dynamics are force. velocity and time, and the functions of those elements are power, space and work. Function is any compound result or product of two or more different elements. A function is resolved by dividing it with one or more of its elements. Force is any action which can be expressed simply by weight, and which can be realized only by an equal amount of reaction, and is the first element in dynamics. All bodies in nature possess the inherent virtues of attracting and repelling one another, which action is recognized as force. Velocity is speed or rate of motion, and is the second element in dynamics. Time implies a continuous perception, recognized as duration, or that measured by a clock, and is the third element in dynamics. Power is the product of force and velocity; that is to say, a force multiplied by the velocity with which it is acting is the power in operation. Power is the differential of work or any action which produces work, whether mental or physical. Power multiplied by the time of action is work—work divided by time is power. Work is the product obtained by multiplying together the three simple elements, force, velocity and time.—*Barnet Le Van, in American Machinist.*

Coloring Cotton Fabrics.—The Alsacians claim to have an art of coloring cotton fabrics that is not possessed in any other part of Germany, in England, or in any other country. They pride themselves particularly on the finish of their calicoes, to which they profess to be able to impart an appearance scarcely discernible from that of silk. Heretofore large amounts of Austrian goods have been sent to Mulhausen to be colored, for which purpose special treaty stipulations have existed, authorizing the import and export of such fabrics duty free. In fact, the Alsacians make bold to say that they have no competition in the world in their peculiar specialties. For their best fabrics only American cotton is fit, no other affording the same texture and finish. The cotton is bought and imported directly from the United States, and there are single establishments that consume thirty million francs worth per year. The agents of the larger factories travel in every part of Europe, are supplied with an endless variety of samples, and authorized to contract directly with retail dealers. This is true of the woven fabrics, of which the sale has greatly increased during the past twelve months, within which time also the exports to the United States have been greater than during any previous year of the past ten.

The completest demonstration ever made that the soothing effect of oil on troubled waters can be put to practical use was made by Mr. John Shields of Perth, England, on March 1. Having chosen Peterhead as the most suitable place for his experiment, Mr. Shields caused iron and lead pipes to be laid from the beach into the sea in front of the entrance to the harbor. A force-pump was attached to the land end of the piping, and near it was placed a large barrel containing 100 gallons of oil. When the white-crested waves were rising to a height of ten to twenty feet at the harbor entrance the oil pump was put in motion, causing the oil to spread in the bottom of the sea, and on its gradually rising to the surface the white foam entirely disappeared, and, although the swell continued, the surface of the sea was perfectly smooth so that a ship or a small boat could have entered the dock without the slightest danger— an impossibility before the oil was distributed in the water.

Zinc and Iron Reaction.—The reaction between iron and zinc is quickened by sulphates of magnesium, iron and manganese, and is made slower by sulphates of aluminium and potassium.

FACTS
For Machinists, Manufacturers and Others.

Water Power and Light.—The prospects of agriculture are not irredeemably hopeless, after all, for there is in some quarters at least a disposition to enlist the best scientific aids in the service of the husbandman for the cultivation of the soil, which indicates with tolerable precision a belief that as yet farming in England is not quite played out. So far as we know, a well-known nobleman who occupied a prominent position in the late Government, is the first to give free rein to the spirit of enterprise in this direction. We refer to the interesting announcement, under the head, "Electric Light Sparkles," in another page, respecting the development of the electric light at Hatfield House, the seat of the Marquis of Salisbury. The principal rooms of the mansion are now lighted with a number of incandescent lamps. An old waterwheel two miles distant, is utilized for the generation of the electric current, and, in the day-time, when not required for illuminating purposes, the dynamo machine is used for pile-driving. As an economical motor, this machine seems to be all that can be desired, and—*mirabile dictu*—it is contemplated shortly to use it for the transmission of power to cultivate all the land within a radius of two miles!—*Martineau & Smith's Hardware Trade Journal.*

Iron and Steel Manufacture in the South.—The present time is of special interest to the iron trade, owing to the efforts to develop the industry South and West. Whatever may be the actual possibilities of the economic production of iron and steel in the Southern States, the fact is established that iron and steel are being made there equal to the Northern products, with which they compete successfully. Further, the developments in those States during the past eighteen months from the mining of ore and coal to the production of steel, give all needed assurance that the making of iron can be successfully prosecuted there on a large scale. There has been a great increase in the number of machine shops, foundries, forges, and small iron establishments to meet the demand arising for the products of such works. These enterprises have served to encourage investment in greater enterprises, and to the perfection of others. Northern enterprise has prospected for favorable furnace and mill sites; immense purchases have been made of mineral lands; examinations have been made, plans perfected, and in some instances work has been begun in the building of new mills and furnaces. The local demand for iron and its products throughout the South will be very heavy for the next few years. Competition in production will be very sharp, and advantages in transportation of raw material and finished products will be a big item when a twentieth of a cent in a pound of iron or steel will decide the location of its manufacture. Large amounts of capital are seeking favorable opportunities of Southern investments. A half dozen or more English companies have already purchased lands, and contracts for machinery, material, etc., are now out for delivery in early spring. Chattanooga, Rome, and Birmingham appear as the leading centers of the coming activity.—*Bradstreets.*

Novel Electric Illumination.—In a large banking house in Paris the use of the electric light is novel and striking. One of the peculiarities of this system is that the offices are illuminated by the Jasper reflecting system, but it is the ceiling itself which is used as a reflector. The effect is said to be splendid. A large hall is illuminated from the top by sixteen Serrin and Siemens' regulators. The arc is concealed by a ceiling of colored lights. Swan's incandescent lamps are used for the staircases and the chambers where the valuables are kept. All the offices are connected with the head office by telephones, pneumatic tubes and telegraphs. The battery is controlled by electrical agency. The fifty elements are placed in the upper part of the edifice as well as the tanks for keeping the liquid. When it is used it is collected by another tank placed in the lower part, from which it is carried by special carriages and brought to a special workshop at some distance. In this workshop the zinc is regenerated, as well as the sulphuric acid, and the sesquioxide of chromium is changed again into chromate. The cycle of regeneration is then complete.

The Trade Winds.—The earth turns on its axis from west to east, and with it rotates daily the envelope of the atmosphere. The velocity of rotation at the equator is something over 1,000 miles an hour; at thirty degrees distance it is about 150 miles less. In higher latitudes it is still less, and at the poles nothing. Therefore, whenever the air moves north or south on the surface of the earth, it will carry with it less or greater velocity of the rotation than the place it passes over, and will turn into an easterly or westerly wind, according as it approaches or recedes from the equator. In the region of the sun's greatest heat, the air, rarefied and lighted, is continually rising, and cooler currents come in on both sides to take the place of the ascending volume. As these side currents come from a distance of about thirty degrees from the equator, they have, at starting, an eastward velocity of many miles less than the localities they will eventually reach. Consequently they will appear to lag behind in all the course of their progress to the equator—that is, they will have a westerly motion united with their north and south movements. These are the great trade winds, blowing constantly from the northeast on this side, and the southeast on the other side of the equator.

Management of Boilers.—The following rules and regulations, issued by the Canadian Board of Steamboat Inspection, for the guidance of engineers and firemen in the management of steamboat boilers, will be found to be interesting and useful: 1. Getting up steam—Warm the boiler gradually; steam should not be raised from cold water in less than four hours; if practicable, light the fires over night; by getting up steam too quickly the boiler will soon be destroyed. 2. Firing—Fire regularly; keep the sides up, and use the slice gently and as seldom as possible. 3. Feed-water—Let the feed be regular and constant. 4. Glass gauge and try cocks—Keep the glass free, and try the gauge-cocks every fifteen minutes. 5. Safety valves—Lift each safety valve at least once a day, and always before getting up steam. 6. Low water—Put out the fires by drawing them or throwing ashes on them; never use water; low water should never occur. 7. Blowing off the boiler—Don't blow off by steam pressure; let the water run off if possible; see that the fires are all out. 8. Boiler purgers—Never use any composition to keep down incrustations, unless supplied through the feed pump. 9. General rules—Keep the boiler clean inside and outside, and free from leak; never throw water in the furnace; under high pressure raise the safety valve gently; lower the fires, or, if necessary, stop the engine when foaming, to find the water level.

S Risley,
Chairman Board of Steamboat Inspection.

Sugar-Cane Reaping Machine Wanted.—A machine, driven by horse-power, for the purpose of reaping sugar-cane in the West Indies is, according to the United States Consul at Antigua, badly wanted. The present system of reaping is tedious, inefficient, and expensive, being confined to the use of the "cane-bill," an instrument resembling a butcher's cleaver. As a consequence, the cane is not always severed to the ground—an act necessary to the proper development of the shoots expected for the following crop. If the canes could be severed by a machine evenly with, or slightly beneath, the surface of the ground, the advantage gained in this respect alone would be of signal importance, and would command the attention of every well-meaning planter in the West Indies. There are grave difficulties, however, to be overcome in the invention of a desirable machine. One is the exceeding strength of the cluster of canes to be severed, often amounting to a dozen largely developed subjects, some standing upright, others bending nearly to the ground; while the unevenness of the surface, owing to eccentric modes of cultivation, is another difficulty which has to be contended against. A successful machine of this kind would, says Consul Jackson, be an epoch in the great sugar belt of the West Indies equal in importance to the introduction of the harvesting machines in the United States.

Japaner's Gold Size.—Japanner's gold size can be made as follows: Powder finely of asphaltum, litharge, or red lead, each one ounce; stir them into a pint of linseed oil, and simmer the mixture over a gentle fire or on a sand bath till solution has taken place, scum ceases to rise, and the fluid thickens on cooling. If too thick, when cool, thin with turpentine.

New Applications of Asbestos.—Applied as a paint, it forms a fire-proof enamel, resisting the influence of oxidation of iron coated therewith, and the influence of white heat; for porous fire-proof materials it serves to give a glassy surface, stopping the pores. It is applicable as a coating for building materials, such as stone, newly faced or decaying or decayed, ornamented or plain, and cement castings and concrete; also for wood, for gas and water pipes inside and outside, for roofing felts and asphalt roofing materials, for roofing of iron and other metals, for the inside and outside of wooden and and iron ships, and for brickwork to resist damp and atmospheric influences. It is further claimed that the material is specially applicable to the protecting of the inside and outside parts of steam boilers exposed to the injurious effects of fire and air.

Porcelain Enamel for Iron.—Flint (quartz), calcined and ground, one hundred pounds; borax glass (anhydrous borax) ground, fifty pounds. Mix, fuse together in a crucible, and let it cool slowly. Powder and mix forty pounds of this glass with five pounds of kaolin (white potter's clay), and grind the mixture to a fine paste in water; pickle vessel in dilute sulphuric acid, and scour with sand to thoroughly cleanse its surface; then line it with a coating of the above paste, about one-sixth of an inch thick, and let it stand in a warm room until the coating is partially dried. Next dust over the surface of the paste coating (still moist) the following powder, and dry in an oven at 212° Fah.: White glass, free from lead or arsenic, one hundred and twenty-five pounds; borax, twenty-five pounds; carbonate of soda, fused, powdered, moistened with water, and dried, twenty pounds. To forty-five pounds of this add one pound soda. Mix thoroughly with a little hot water, dry, and reduce to fine powder. When the coating on the iron has dried, the vessel is put in a muffle and the heat gradually increased until the glaze fuses, when it is taken out, more glaze powder is dusted on, and after a second heating allowed to come very slowly. Some of the glasses employed are made of friable mixtures of feldspar, sodium, borax, and oxide of tin. Feldspar is sometimes added to the enamel.

Brick Clay and Fire Clay.—The main chemical difference between fire clay and ordinary clay is that the former contains no lime or iron. These substances are not objectionable for ordinary building brick, but they render the material unfit to resist strong heat, as they cause the brick to vitrify first and to fuse finally, when high temperatures are attained. In physical appearance the fire clay, or slate clay, is gray or grayish yellow; massive, dull, or glimmering from admixture of particles of mica. Its fracture is slaty, approaching sometimes to earthy. It is soft, sectile, and easily broken. It adheres to the tongue, and breaks down in water. It occurs along with pit coal. For making fire brick it is ground and reduced into a paste with water.

A Wonderful Map.—At the nobles' school in Tokio, Japan, is a physical map of that country 300 or 400 feet long, in the court behind the school building. This map, or model, is made of turf and grass, and is bordered with pebbles which look, at a little distance, like so much water. Every inlet, river and mountain is reproduced in the model with a fidelity to detail which is simply wonderful. Latitude and longitude are indicated by telegraph wires, and tablets show the position of the cities. Ingenious devices are employed in illustrating botanical studies also. For example, the pine is illustrated by a picture showing the crone, leaf and dissected flower set in a frame which shows the bark and longitudinal and transverse sections of the wood.

"What Alexander Might Have Done."

The late Czar of Russia was eminently a great man, as his action in liberating thirty-six million of serfs from slavery qualified him to be. Yet with all his greatness, Alexander left it to Dr. Swayne to liberate the world from the annoyance and pain of scores of skin diseases, by producing Swayne's Ointment. Think of the tens, hundreds, thousands it has cured, and then remember it is economical, effective, reliable and pure, and if you will only try it you will have a cure.

When writing to advertisers mention this paper.

ITEMS OF INTEREST.

THE Philadelphia carpet factories will produce 40,000,000 yards of carpets during the present year.

COTTON seed oil is advancing in consequence of the destruction of seed by the floods in the Southwest.

PETROLEUM under the invention of the German chemist, Dittman, will soon come into the market in a solidified form.

AMONG the latest arrivals from the South are red winged blackbirds which in ordinary years are not seen before April.

CAPTAIN Burton Parsons, one of the pioneers of Vermillion, O., and well known as a vessel builder, died on the 19th ult.

THERE are 1,000 artesian wells in California, 300 of which are in the Santa Clara valley. They average from 150 to 250 feet deep.

A NOVELTY in wire fences charges the wires with electricity so that animals never go near the fence a second time, one shock suffices.

THE United States sends this year about $600,000 worth of oysters to Europe, and the whole trade of New York amounts to about $3,000,000.

AN English patent has been obtained for producing solid steel castings by the use of moulds built of brick and brought to a bright red heat by means of gas jets.

THE Lowe Metalic paint manufactured at Chattanooga, Tennessee, from iron ore taken from the earth almost within the boundaries of that enterprising southern city, is being largely used by railway companies on cars, depots, etc.

MESSRS. Bard & Clark have entered on the hardware business both in the retail and jobbing line in Cleveland, establishing themselves at 168 Superior street, opposite Bank street. Their store has just been opened. They make builders' hardware and fine cutlery a specialty. Mr. Bard was formerly located at Alliance, O., and Mr. Clark at Van Wert, O.

THE Lima House, Lima, is highly spoken of by all persons who sojourn there. In addition to well furnished apartments, excellent general accommodation, an admirable table, and reasonable rates, it has the advantage of being centrally located. A telegraph office is in the house and omnibus and street cars run to and from the depot. Mr. I. Goldsmith is the proprietor.

IT is said that this year's Paris Salon will be used to gratify an unusual number of personal spites. Not fewer than a score of artists, some of them famous are expected to send pictures suggested by private feuds. Thus M. Henner lately dined with M. d' Artigues, and took offence at being made to drink wine which was not old enough to please his taste. Using his palette to avenge his palate, he has painted a picture which represents his host as an "Orleans Vinegar Seller."

CAPTAIN Eads says of his proposed ship canal: "The cost of the railway will be $75,000,000, and it will only take four years to build it. The cost of the De Lesseps canal will not be less than $400,000,000, and it will take twenty to twenty-five years to build it. The railway will be 1,200 miles nearer the United States than the canal, and it will escape all the effects of the deadly climate of the isthmus proper, where it rains six months in the year. It will be built on the Mexican territory. My grant from Mexico allows me to secure the joint interest of any other nation in the road. Mexico gives 1,000,000 acres of land, freedom from taxation, etc. I offer to transport American shipping at one-half the cost of that of any other nation excepting Mexico. There are two routes proposed, one 140 miles and the other 115 miles long. The first ten miles I offer to build without Government aid, and when it has been tested by the transportation of a vessel over it, then the Government is to give a guarantee of $5,000,000 and so on, as each section is built, the whole sum not to be guaranteed until the road is completed. The Government will be paid back any money it advances, principal and interest. British engineers have offered to construct the first ten miles. If Congress does not pass the bill this season I will make arrangements in Europe for the work."

THE Western Union Telegraph company reports its revenue for the year 1881 at $16,868,396; expenses, $9,489,269; net profits, $7,379,127, and surplus after paying dividends, etc., $886,988.

THERE is a scheme on foot to establish ginneries at every accessible point on all the railroad lines, purchase the cotton seed, gin it, and with the Dederic press, press it into bales of 125 pounds each, and sell direct to the factors.

The Wood Worker is the name of a new illustrated weekly established in Indianapolis, Ind., devoted to industries in this line, west and south. Judging from the variety of instructive matter in the first number it is calculated to do good service.

THE periwinkle has 600 rows of teeth, three in a row, growing on a long strap, like pins in a cushion. This strap, often two inches long, closes the edges together at the back of the mouth so as to wrap over the rough points, and is then rolled up into a coil and stowed away in a fold of the neck. As the front teeth wear away, this strap comes gradually forward on the floor of the mouth, and the new teeth grow up and are sharpened ready for use.

AN Italian who it is, perhaps, unnecessary to say has lived some time in America, has come to the conclusion that it is a huge basin of petroleum under Vesuvius which keeps the bowels of that interesting mountain in a constant state of ebullition more or less active. He therefore proposes to dig a tunnel at its base, tapping the great cauldron, and thus putting the mountain at rest and securing an unlimited supply of petroleum.

A dauntless citizen of Georgia is said to be on the point of publishing a descriptive catalogue of all the unmarried women in the State who now own or expect to inherit property valued at $50,000 or more, with accurate details as to age, appearance and personal characteristics. The mercenary aspect of this enterprise is more than offset by the intrepid valor which can contemplate without quailing the inevitable errors which will find their way into such a volume.

LIGHTNING CONDUCTORS.—From the report of the Lightning-rod Conference recently held in England some useful hints may be gleaned. The rod at its summit, it appears, should be simply bevelled, so that the full conducting power of the rod may be ready to receive a disruptive discharge, while at about a foot below the extreme top there should be firmly attached by screws and solder a copper ring carrying three or four copper needles six inches long, and tapering from one-quarter inch to as fine a point as can be made—the points to be platinized, gilded or nickel-plated. These points are to induce the silent discharge, and thus, as it were, to prevent the difference between the electric potential of the cloud and the earth reaching such an amount as to cause the passage of a spark. Vanes, finials and all pieces of metal work on the upper portion of edifices should be in metallic contact with the conductor.

SUPERIORITY OF STEEL.—Another remarkable instance of the superiority of steel over iron for shipbuilding purposes is reported. The steamer "Lerge Viken," whilst running at full speed, ran on the rocks north of Heligoland, where she stuck for nearly six hours, when she was got off with assistance. The steamer appears to have very fine lines; still, in spite of this, the plates, when examined in dock, were found perfectly sound. True, as the report states, there were some dents but no fractures, and no repairs were deemed necessary. Iron certainly could not have withstood such a test, and there can be no doubt that such proofs of the elasticity of "mild" steel will tend to increase the preference of steel over iron for steamers.

TRADE BETWEEN SOUTHERN AND PACIFIC STATES.—The Southern Pacific Railroad is fostering trade between the Southern and Pacific States. Thus California grain and flour are coming East by that route and cotton is going West, 100 bales high grade having been shipped from Galveston to San Francisco last week. Sufficiently low freight rates were given to encourage a reciprocal interchange of commodities. The cotton is to be used in California woolen mills, where mixed fabrics to some extent are manufactured. There is much in the possibilities outlined by the opening up of the Pacific Coast trade, which New Orleans and Galveston business men seem disposed to take hold of and push with vigor.

MANAGEMENT OF STATIONARY ENGINES.—A recent writer, in the course of an article on the care and management of stationary engines, speaks as follows of the cause and cure of pounding: To ascertain where the pound or thump is, is not always an easy matter. The writer has found, in searching for "thumps," that they can generally be found without any trouble if the valve stem is disconnected from the rocker shaft or eccentric rod, and a wooden lever rigged up by passing the valve stem pin through the lever, leaving it in the valve stem boxes also, and the lower end tied to the cross-head or other convenient object. By this device a little steam may be given (not enough to run the engine), when the valve stem and valve may be shifted, by means of the wooden lever, by an assistant, so as to alternately allow the steam to enter each end of the cylinder. This will take up the slack in all of the connections, when lost motion may be easily seen and felt. The operation is known as "churning" an engine, and is very efficacious in developing lost motion when it exists. When the main rod or main shaft boxes can only be run when loose—that is, if tightened up to where they ought to be, they heat—it can be set down as a fact that the shaft or rod is not in line. Nothing is more of a nuisance than to hear an engine pounding, and nothing is more discouraging to those who desire to see stationary engineers get along, than to be told that the pound cannot be taken out. Pounding engines pronounced incurable by their engineers will generally be found out of line. This is indicated by the impossibility of adjusting the boxes to where they belong without their heating.

RAILWAY SIGNALS.—The railway alarm signal for passengers on the Emperor Francis Joseph Railway, Austria, consists of rods under every carriage, coupled together and communicating by a system of cords and pulleys, with the steam whistle. Other cords, passing around pulleys, are attached to the rods, and are led to each compartment, the ends being protected by a frame closed by a sheet of paper. This paper must be burst open before the signal can be given by the passengers.

REVIEWS.

Atlantic Monthly for April. BOSTON: Houghton, Mifflin & Co.

Each number of this monthly magazine of literature, science, art and politics is of sterling value. It is contributed to by the first writers of the day, and blends in an eminent degree amusement with instruction. Its first article is "Europe before the Arrival of Man," an absorbingly interesting exposition, written in life-like style, of pre-existing mammals, reptiles, birds, insects, fishes, molusks and crustaceous creatures, and which takes into account the indirect traces of life. "An Echo of Passion" is an eventful story, abounding in thrilling scenes, and marvellously revealing the working of natural emotions. "Shakespearean Operas" are cleverly analyzed. "The House of a Merchant Prince" is evidently from the life, and the story, which is not wanting in drollery, is capitally told. To this is added a modern story, the scene of which is in Venice, and another, which once read will never be forgotten, "Jacob's Insurance." "Dr. Zay" is a novelette full of surprises. Among other sketches and articles are "The Nixie Maiden," "A Modern Hindoo Reformer," "A Realistic Poet," "The Folk Lore of Lower Canada," biographical studies of Noah Webster and John Quincy Adams, and "The Mendelssohn Family." For rich entertainment and abiding value we strongly commend this monthly.

The Century for April. Illustrated Monthly. NEW YORK: The Century Company, Union Square.

This number is brimful of interesting articles and replete with illustrations. The frontispiece is a portrait of Matthew Arnold. A sketch of Tunis is given. "The Age of Praxiteles" affords rich and engaging disclosures of the beauty of Grecian art and of its animating spirit. "Opera in New York" is continued, with portraits of prominent stars. "The Oddities of Southern Life" takes up amusing features suggested by Longstreet's "Georgia Scenes." "Some American Tiles" treats of their manufacture and includes designs. "Russian Jews and Gentiles" are presented from a Russian point of view. "Ninita" is a pretty novelette relating to a girl of Santa Cruz. "Was the Earl of Beaconsfield a Representative Jew?" makes a telling article.

SCIENCE AND INVENTION.

A NEW HOOP MACHINE.—A new hoop machine consists of two revolving cutters, four inches in diameter, with a revolving gauge. The pole from which the hoop is cut is drawn rapidly through the machine, and the hoop is of uniform thickness, requiring no planing or shaving, but is ready for use at once. Three hoops are cut from most of the poles, and in some cases four hoops. During five minutes time 20 hoops were made by this machine, which measured 160 feet in length. It is claimed that a man can make at least 3,000 hoops a day with it, which is an immense saving, as 300 made in the ordinary way are regarded as a day's work.

INCANDESCENT ELECTRIC LIGHTS.—In concluding his report upon the different systems of lighting which were exhibited at the Paris Exposition, Du Moncel says that the systems of incandescence are already numerous, and doubtless many others will soon be added. Most of them differ from one another only by the composition of the incandescent carbon and its mode of fabrication. It is impossible to base any correct judgment on the more or less brilliant aspect of the lamps, for, as they are fed by electric generators to very different intensities, those which have the strongest currents naturally furnish the most brilliant and whitest light. It would therefore be imprudent, he thinks, to pronounce in favor of any single system until a serious examination and comparison have been made by a commission of disinterested and scientific men. There is, however, reason to hope for a satisfactory solution of the problem of household illumination by electricity.

DRY DISTILLATION OF WOOD.—The dry distillation of wood and the utilization and refining of the products appear to be making great headway in Germany. The manufacture of aniline requires large quantities of wood alcohol, which is now purified much more cheaply and better than air. Acetic acid is now made of a quality not alone sufficient for technical purposes, but for table use. The charcoal is compressed into cylindrical blocks weighing about one-tenth of a pound. They are largely used, a contemporary says, for domestic purposes, as they burn without smoke.

NEW FORM OF SCISSORS.—A novel pair of scissors has been devised by Herr Sievert, of Dresden. The blades are represented by two circular steel knives, which slightly overlap at the edges, and are pressed together by two spiral springs. The knives are fastened to a pair of wooden rollers, with india rubber rims, which grip and guide the cloth or paper as it passes between the knives, so that the latter may cut straight. These cutters are carried by two handles or levers which are held in the hand, and the cutting is effected by pushing the scissors forward, so as to cause the rollers to revolve.

ELECTRICITY IN MINES.—Electricity is now used in mining operations in the Loire valley for transmission of force. At the works of the Compagnie de la Ferroniere, two connected Gramme machines are employed to work a large drum which stands at the head of an inclined plane. The work goes on with great regularity. The starting and stopping can be done as gently as desired. By means of a galvanoscope in the circuit, one can tell at any moment what is being done at the incline, whether the work is stopped, whether the wagons are coming up filled or not, etc.

AN ADJUSTABLE CATTLE SHED.—This shed is by means of pivot and a weather-vane over it made to turn with the wind, so that its closed side is always against the blast.

ARTIFICIAL RUBBER.—By a mixture of coal-tar, linseed-oil, hemp-oil, spermaceti, sulphur, and some other ingredients, a St. Petersburgh inventor has been able to produce a material having all the properties of india-rubber without its disadvantages. It will bear extremes of heat and cold without injury, is very elastic, and is unaltered by exposure to climatic influence,

MINES AND MINING.

THE length of the shafts and galleries in the Comstock mines of Nevada is 250 miles. During the twenty years just closed 350,000,000 tons of waste rock have been hoisted, 1,760,000,000 tons of water pumped to the surface, and the net result of all this work was $325,000,000 in bullion.

FEBRUARY yield of Calumet & Hecla 1635 tons 785 pounds; Quincy 196 tons, 1656 pounds; Allouez, 84 tons, 1155 pounds.

THE San Francisco Stock report says the Californians are disgusted with the mining markets, and appear to be losing interest in the mining industries. And Californians are not the only ones, either.

THE annual yield of the copper mines of Michigan in pure metal now rivals that of ore mines of Chili, and far outstrips the product, past or present, of any of the copper districts of North America, England, the European continent or Australia. All of the Lake Superior copper is not an ore, but a pure metal, which is marketable after it is freed from the rock in which it is imbedded.

EIGHT car loads of lead and silver bullion were forwarded recently by the Mexican National railway from Laredo, Texas, to New York via Corpus Christi.

LARGE deposits of salt, coal and other minerals have been found on the Texas and Pacific's land in El Paso county, and prospectors are asking permission from the company to enter these lands. It is understood that the company, not desiring to sell the lands, will allow the prospectors to go upon them upon the condition of their returning one quarter of the mineral product taken from the lands.

THE Sitting Bull mine, Bear Butte mining district, Dakota, produced on February account 100 tons of base bullion carrying 46,000 ounces silver and a small quantity of gold. In January it shipped 15,000 ounces silver bullion resulting from the low grade dry ores which were milled at the Florence

THE earnings of the Silver Cord Combination Mining Co., near Leadville, Col., were from thirty to thirty-five thousand dollars a month over expenses. The ore is high grade in lead, and carries a fair amount of silver and a trifle in gold. It yields from twenty to thirty dollars a ton net over expenses of smelting.

THE Stephenson Mine in the Organ Mountain, Dona Ana county, New Mexico, was discovered and worked in a primitive way, some thirty years ago, extracting only the argentiferous lead. The discoverer in this manner took out $50,000 before selling the property in 1857 to a company composed of officers of the United States Army stationed at Fort Filmore, near by. This company purchased machinery at a cost of $40,000 which was seized and confiscated by the confederates. The owners have decided to await the entrance of capital and labor.

THE Farewell Consolidated mine and mill at Independence, Col., are running first class, and the results obtained are highly satisfactory. The bullion produced last month exceeded $29,000, and several day's delay occured during February owing to the breakage of machinery in the mill. The production will likely exceed $35,000 for March.

INFORMATION is recoived from Colorado of the greatly improved condition of the Crysolite mine. A great deal of prospecting work has been prosecuted during the past two months and a number of drifts are now opening into ore. The value of the mine has never been doubted by those acquainted with it.

THE mines of Siberia are found and worked either in frigid regions or primeval forests, rugged mountain wastes or swampy wilderness; regions which for the greater part of the year are covered with snow and ice, and at other times almost drowned in water. It is only in the winter, however, that these rude works of excavation are made, as their trenches and pits would be flooded in the summer season with water that everywhere oozes from the saturated earth. These trenches and pits are dug in a soil which had to be previously softened by burning upon it great heaps of logs intermixed with dried branches until the whole was converted into ashes. In fine, every possible difficulty surrounds and obstructs mining in the Russian gold fields, and so tends to limit the product, as to stamp these statements from Russian officials with incredibility.

Silver Valley mine, in Davidson county, N. C., seems to be the bonanza mine of the State at the present time. They employ about eighty hands, and are producing about five tons of concentrated ore daily, which is reported to be worth $500 per ton. At any rate, it is safe to say that this is one more paying mine in the State.

THE annual value of the oyster crop of Delaware Bay, along the New Jersey shore, is estimated at $2,450,000.

THE lumber trade of Chicago, thus far this year, has been exceptionally good. The total disposition of lumber at that point to March 9th is shown to be 115,120,000 feet, or 100 per cent. in excess of the disposition of 1881 to the same date.

A CHEMICAL analysis of the potato reveals the fact that in 100 pounds of potatoes there are 75 pounds of water.

MARKETS.

FINANCIAL.

Office of TRADE REVIEW AND WESTERN MACHINIST.

FRIDAY EVENING, March 31.

A fair activity has characterized banking operations. The rate on good collaterals is 7 to 8 per cent. Call loans are negotiated at 5 per cent., and time loans at 6 per cent.

IRON.

There is but moderate animation in the pig iron market. Prices are firm, this firmness having been increased by cable advices of an advance in England, and any considerable orders, which are not likely to be long delayed, would appear calculated to advance prices. Still buyers are acting with caution. Producers are not disposed to press the market. Ore freights are still flat, and charters to carry from Escanaba to Cleveland have been made at $1 for a few trips, and $1 35 for the season; another has been made at $1.20 per ton. A charter of four trips from Marquette to Cleveland has been made at $1.35.

CINCINNATI--(Reported by Rogers, Brown & Co) The market has been without special features. Buying is going on steadily, but in a small way, to meet current wants. Such lots as furnaces making standard brands are able to offer are readily taken at figures within the quotations below. There is no abatement of consumption. There is a better feeling among car wheel makers, but little inquiry for metal yet. The year in this branch of trade promises to be fair, but not as good as last year. We revise quotations to meet the conditions of the market. Hot Blast Foundry, Hanging Rock, C C., No 1, $29.00@$30.00; No. 2, $27.50@$29 00; Southern, No. 1, $27.50@29.00; Strong Coke, No. 1, $26.50@28.00; No. 2, $25.00@27.00; No. 3, $24.00@26.00; Soft Stone coal No. 1, $24.50@26.50; No. 2, $23.50@$24.50. Forge--Strong Neutral, No. 1 Mill $24.00@$25.00; Cold Short, No. 1 Mill $23.00@24.50. Car Wheel and Malleable--Hanging Rock Cold Blast, $35@38; Hanging Rock Warm Blast, $29@31; Southern Car Wheel, $35@38; Lake Superior, $34@36; Lake Superior Malleable, $34@$36.

CINCINNATI.--(Reported by E. L. Harper & Co.) The week has been a quiet one The furnacemen, rendered somewhat comfortable financially by the fair prices sustained through the winter months, and conscious of the limited supplies on hand, are indisposed to gratify the demand of buyers for concessions, which attitude results in a reserve on the part of both producer and consumer, interrupted in the main only by purchasers for immediate wants. The fact that a healthy spring business, and an average crop will call out all the iron on hand is with pig iron producers a strong anchor well grounded.

COPPER.

Market quiet; transactions have taken place in Lake Ingot at 19@19¼c. and for Baltimore 19c. Arizona Copper meets with a ready sale at 18¾c., and only fails to realize the same price as Lake, because newly introduced. The combination prices of manufactured copper are unchanged. We quote bottoms 31c@32c.; Braziers 30c.@36c.; Circles 33c.@36c.; Sheathing 28c.; Baltimore Copper 30c.; Segment Sheets 33c.; Fire box sheets 30c.

LEAD.

The lead market is quiet, and transactions have taken place at $4.85@4.90. Common Domestic rules at $4.58@4.72.

SPELTER AND ZINC.

Business in Spelter is moderate; prices have an upward tendency in consequence of an attempted combination in England. Silesian, which lately sold at 5½c., has risen to 5¾c. Sheet zinc is quiet at 7¼@7⅜c. We quote the Bertha Zinc Company's refined at 8c.

TIN AND TIN PLATES.

Sales of tin are somewhat limited. We quote Straits 24¾c@25c for large lines, and Lamb and Flag 25½c. The market is fluctuating in tendency. Tin plates, chi fly influenced by foreign advices of reduced output in Wales, are firmer, and there is a steady demand.

COAL.

The local trade has been good. Coal is arriving in large quantities for shipment, and loading of vessels has commenced. The following are quotations for present charters: Lake Michigan ports 75c, Detroit 40c., Marquette, 60c, Portage, 75c., Duluth, $1.00.

HARDWARE.

The demand for general hardware continues to be satisfactory as regards volume, and values are remarkably firm, with the tendency in some lines still upward. The demand for nails improves, and there has been quite a liberal movement. The usual season demand for agricultural implements is setting in. In picks, shovels, vices, tools, and shelf hardware generally, there is a steady movement. Although a number of hardware manufacturers announce in circulars that their capacity and facilities prove entirely too limited for their increasing business, making it difficult, in many cases, to fill orders as punctually as they desire, the fact is that stocks can be more readily replenished than at any time during a long previous period. Still, dealers whose orders have accumulated, do not get supplies with all the promptitude they desire. Country dealers accordingly are disposed to moderate orders, distributing these over the season Foreign hardware is in fair request, prices steady and unchanged

LUMBER.

With increasing demand and scarcity in some grades, no material change of prices has taken place. Cleveland lumber is firm at quotations. A larger business is anticipated than at any previous corresponding season. The orders of country dealers are on an increasing scale. The activity of building strengthens the demand. Supplies of dry lumber are greatly wanted. The announcements of shortage in the lumber cut appear to have been greatly exaggerated. Of hard woods there is likely to be a more moderate supply of maple, ash, oak and other heavy woods; but it is not likely there will be a falling off in supply of poplar, walnut and southern woods. Timber shipping from East Saginaw has commenced. One charter to Cleveland is reported at $2 50. The correspondent of the Northwestern Lumberman anticipates 10 shillings freight from East Saginaw to Cleveland before July 1.

WOOL.

There is considerable activity in the eastern wool markets, and prices are somewhat easier. Ohio X and XX command 43@44c.; Ohio XXX 45@47½c; No. 2 Ohio 38@40c. Large purchases of these have been made, however, in this State the past few weeks at the same figures. Sales have been made of Ohio ungrading, washed, domestic fleeces at 41c. Sales of combing and delaine, No. 1 Ohio have been made at 50c.

LUMBER.

PLANK, MIXED WIDTHS.

2 inch, 12, 14 and 16 feet, together.

A 1 and 2	$50
A 3	40
B	32
C	22
D	16
E	13

1¼ and 1½ inch.

A 1 and 2	$48
A 3	40
B select	32
C	22
D	16
E	13

BOARDS.

One Inch, mixed widths.

A 1 and 2 uppers	$44
A 3	36
B select	30
C	22
D	16
E	13

STOCK BOARDS.

12 Inches wide.

A 1 and 2	$45
A 3	38
B	32
C	24
D	16

STRIPS.

6 Inches wide.

A 1 and 2	$42
B	35
C	25
D	18
E	14
Norway Fencing Strips	18
Norway Flooring Strips	25

WORKED LUMBER

FLOORING.

Flooring—A 3	$43
B	38
C	34
D	30
Norway Flooring—A 3	28
C	22
D	18
Matched Drop Siding, 6 inches—A 3	43
B	38
C	34
D	30
Beaded Ceiling $2 higher than Flooring.	
One half inch Bevel Siding—A 1 and 2	34
A 3	30
B	18
Ash Flooring—A 1 and 2	40

BILL STUFF.

Small, joists, 12, 14 and 16 feet	$16
18 feet and under	$17
Timber, larger than 8x8 special.	

Long timber, 20 feet and over, adds about $1 per foot per M. to the price of short.
Cedar Posts, large 30 00
" " medium 25 00
" " small ..... $15 to 20 00

SHINGLES, LATH AND MILL WORK
Shingles XXX $4 50
Clear Butts 3 50
Lath 3 00
Surfacing, one side, adds $1.50; two sides $2.
Matching, flooring and drop siding, $2.50.

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PROPERTIES,

Group of developed and producing gold and silver mines in Distriet of Chapatuato.
Group of developed and producing silver mines in district of Ozumatlan.
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Gronp of gold prospects in the district of Tiquio.

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Senor Don J. M. Solorzano, Banker, Vice-Pres.
Senor Don Pedro Gutierrez, Gen. Agent.

Agent in City of Mexico:
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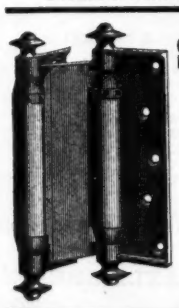

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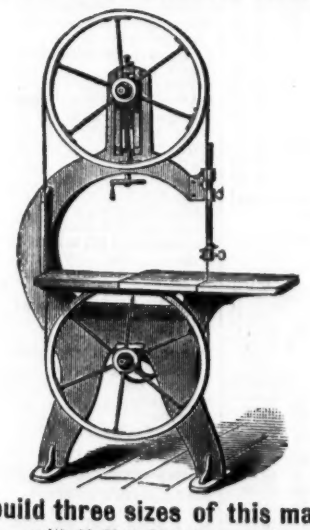

We build three sizes of this machine
with 26, 30 and 38 inch wheels.
The two smaller sizes will saw hard wood 12 in. thick, the largest 16 in. thick. They are made of the best material and are well made.
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Heavy Punch or Shears

Used for punching Railroad Fish Plates. Punches four holes at a time. Weight over Five tons. Good as new. Address
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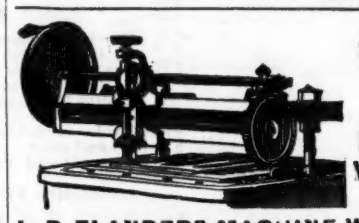

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New Descriptive Circular on application.

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Operating with downward visible drop. The principle of this Lubricant is entirely new; being the only one manufactured operating with a downward visible drop, and does not conflict with any other patented Lubricator, being protected with Letters Patent, granted July 5, 18-1.
☞ A saving of from 50 to 90 per cent in cost of oils. Send for Circular.

Portable Mulay Saw Mill,

With improvements recently made is unequaled as a neighborhood mill. It can be run by either steam or water power, and is especially adapted to the engines used for threshing.

It may be operated by either two or three men, and will cut as much lumber in proportion to the power and number of hands employed as mills of larger capacity.

It makes smooth and even lumber, leaves no stubshot, and will cut any sized log up to four feet in diameter.
It may be transported from one locality to another and re-erected ready for sawing in from two to three days, and can be made profitable in localities where there is not sufficient timber to justify the erection of a large mill. Send for descriptive circular, price, etc., to
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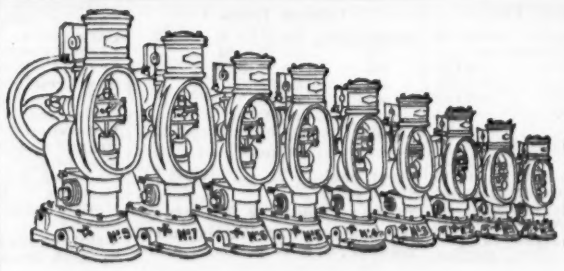

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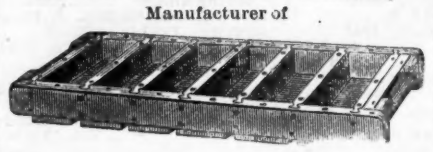

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Machine and Blacksmith Tools of every description, Woodworking Machinery in all its Branches, Portable Engines, Upright and Horizontal Stationary Engines, 1 to 300 horse power, Locomotive Fire-box, Horizontal and Upright Boilers, 1 to 100 horse power, Waterwheels, Cotton and Woolen Machinery, Steam Pumps, Grist Mill Machinery, &c., &c., &c.
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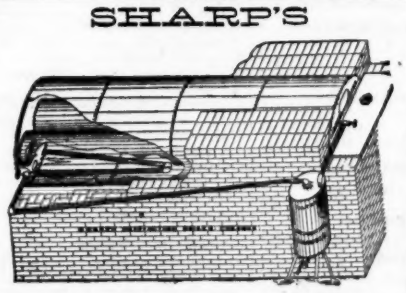

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For Boilers of from 5 to 150 H.P., with Base, or Bracket on smaller sizes! Price $30 and upwards. Small sizes indispensable for Farm and traction engines. Also make a specialty of all kinds of castings. Send for new 1882 Catalogue.

AGENTS WANTED
EVERYWHERE to sell the best **Patented Saw Filer** made. *With* it an apprentice can file a Saw as well as the best expert *without*. They **sell** on their **MERITS.** Secure **exclusive territory and BIG Profits.**
J. A. Lannert, Cleveland, O.

G. M. HEARD & CO.
Gold, Silver & Nickel Platers
109 Ontario Street.
CLEVELAND, O.

B. F. Roberts,
BOILER MAKER,
And Sheet Iron Worker.
BRIDGE STREET, SPRINGFIELD, OHIO
Special attention paid to taking out and Piecing Portable Flues.
☞ Orders by mail to B. F. Roberts, Springfield, Ohio, promptly attended to.

E. F. ENSIGN,
JOBBER OF
Agricultural Implements,
WAGONS, FERTILIZERS, SEEDS, &C.
The Empire Grain and Fertilizer Drill and Twine Binding Harvesters Specialties.

Springfield Brass Foundry.
Pattern and Model Work a Specialty.
Castings done in White Metal, Brass, Zinc, Type Metal, Pig Lead, Pig Tin, Bar Lead, Bar Tin, Antimony, Copper, Spelter, &c., &c.
Cash paid for Old Brass and Copper
McLAUGHLIN & SHILLING.
68 South Limestone Street,
SPRINGFIELD, O.

PURE PREMIUM BONE.

The tried and never failing Fertilizer in all grains and grass crops. It has proved its value as such by years of actual use all over the world. Circulars and Price List free. Address all letters pertaining to the purchase of Premium Bone, or the sale of bones, to **Excelsior Fertilizer Works,** Salem, Columbiana County Ohio.

Cleveland Wholesale Prices.

HARDWARE.

Adzes.

Carpenter's ..... per doz $16 80
Ship ..... " " 18 75
Heavy railroad .... " " 19 50

Axes.

Hunt's ..... ₱ doz $ 9 50
Lippincott's Crown ₱ doz 9 00
Cut More ₱ doz 9 00
Peck's Double Bit ₱ doz 22 00
" Champion Blade ₱ doz 11 00

Anvils.

Eagle, Amer... per lb. 10c dis 15
Wright's ..... 11½c@12c
Armitage's Mouse Hole 9¼@9¾c
Trenton 10½c
Wilkinson's 10c

Animal Pokes.

Berea, per doz 4 00
Eagle, per doz 6 00

Apple Parers.

Domestic & Reading ₱ doz $7 50
Turn Table 9 00

Cleveland Stamped Elbows

Genuine Russia Iron

4 inch per doz 4 50
4½ do do 5 50
5 do do 7 50
5½ do do 8 50
6 do do 9 50
7 do do 11 00

Planished American Russia Iron

4 inch, per doz 4 00
4½ do do 5 00
5 do do 6 50
5½ do do 7 50
6 do do 8 50
7 do do 9 50

Charcoal Iron

4 inch, per doz 2 00
4½ do do 2 50
5 do do 3 50
5½ do do 4 00
6 do do 4 50
7 do do 5 50

25 per cent

Augurs and Bits. Dis

C S cut augurs ..... 40@10
do do do bits ..... 40@10
D C gimlet do ....$6.00 Gross
Snells ..... @40
Russell Jennings' ..... 10 10@10
Cook's pat augur ..... 40@10@50
Post hole, net ₱ doz ..... $21@24

Balances. Dis

Chatillon's, Frary's, Morton's 15 & 10 per ct

Bellows. Dis

Blacksmith's com new list, 40 ₱ ct
Moulder's new list, dis 40 ₱ cent
Hand, new list, 40 per cent

Bolts. Dis

Carriage and tire, com 80
do do Norway .. 65
Stove 40
Plow 30
Wagon 40
Machine & Square head 55
Skein, ... 55
Bolt ends, ... 55
Lag, ... 55
Tap, ... 55

Butts. Dis

Wrought brass 65
Cast, loose joint ..... 40&10
Pin, japanned and silver tipped ..... 45&10
Wrought, fast joint narrow ..... 40&10
Wrought fast joint broad ..... 45&10
Wrough loose joint broad ..... 45&10
Wrought table and back flaps ..... 40&10
Loose pin, reversible ..... 45&10
Brass kettles—per lb .. 32@35

Chains.

Coil by cask, ...

3-16	¼	5-16	⅜	7-16	½
10½	9	8	7	6⅛	6¼

Crucibles.

Per number ..... 4@ 4½

Clothes Wringers

Keystone per doz ..... 42@45

Chisels.

Hot and cold cutting .. ₱ lb .. $ 30
Railroad track 30
Machinists 30
Chipping, mallet head 50
Cape 50
Packing 50
Stone cutters 50

Crowbars.

Steel point ..... ₱ lb $ 5
Solid steel 8

Drawing Knives.

Discount.

Witherby's ..... 60@10 ₱ cent
Barton's 15
Adjustable handle 10

Emery.

Genuine Chester ..... 7@ 8
Wellington ..... 10@12

Files.

Auburn ..$5 to £ dis 35 pr cent
E. M. Boynton's, new list dis 25
J. & Riley Carr ..... 4.50 to £.
Johnson & Bro. ..... dis 30
Butcher's ..... 4.50 to £.
Walter Spencer & Co.'s "Diamond" ..... 4.50 to £.
Fisher's ..... 4.75 to £
Moss & Gamble ..... 4.50 to £.
H. Disston & Sons (new list) ..... dis 40 per cent
Heller Bros.' Horse Rasps dis 30
Nicholson ..... dis 40
New American ..... dis 40
Union File Co. ..... dis 40

Horse Rasps.

Heller's ..... dis per cent 30
"Arcade" ... 50 & 20

Harrow Teeth.

Iron ¾ to 1 inch ..... per lb 3½c
Steel, square 4½c

Hammers.

Mason's stone hammers, steel faced and pene ..... ₱ lb 15
Mason's stone hammers, solid cast steel 25
B. S. Napping hammers 30
Striking hammers, solid cast steel, 5 to 25 lb 20
Drilling hammers, solid cast steel, 3 to 6 lb 20
Turning hammers, full polished ..... each 2 00
Set hammers ..... ₱ lb 35
Creasing hammers 35
Ordinary bush hammers 55

Nails.

BRADS AND PENCE.

10 to 60d 3 40
8 and 9d advance 25
6 and 7d ..... do 50
4 and 5d 75
3d 1 50
2d 2 75
3d fine 3 00
2d fine 3 75
¾ inch 3 00
4d barrel 1 00
1¼ inch barrel nails 1 50
1½ do do do 1 75
1 do do do 2 50
⅞ do do do 3 00
Cut spikes, all sizes 25
Clinch nails, all sizes 1 75
Casing and box nails 75 cts advance
Finishing nails, $1 25 do
Tobacco nails, 50 cts do

Nuts and Washers

Dis

Nuts 7
Washers 6

Picks.

Railroad, 4 to 5 lbs ... doz $7 75
5 to 6 lbs ... 7 75
to 7 lbs ... 8 50
7 to 8 lbs ... 9 50
Railroad Tamping Pick ... 7 to 8 lbs .. doz 13 50
Mill Picks per lb 75c

Rivets.

Iron ..... dis 40
Tinned ..... dis 40
Copper ..... dis 33⅓

Squares. Dis

Steel or iron, case lots 50
Try squares and T bevels 40

Spikes—WROUGHT

All lengths by ¼ inch 4½c
do do do 5-16 ..... 3½
do do do ⅜, 7-16 & ½ in 3¼

Shovels and Spades.

Ames' new list, July 1, 1881, ... dis 15
Old Colony ..... dis 15
Remington's (Lowman's Patent) ..... dis 30
Rowland's ..... dis 40 and 10
Griffiths ..... dis 40&10

Shovels and Tongs.

Iron and Brass Head, R. & E. list ..... dis 60&2
Polished Steel, new list dis 50&10&2

Sad Irons.

From 4 to 10 lbs ... per lb 3½ net
Self-Heating ..... ₱ doz $9 net
" Tailors .. ₱ doz $18 net
Gleason's Shield and Toilet ..... dis 25
Mrs. Pott's Irons, double pointed ..... dis 40
Mrs. Pott's Irons, square back ..... 45 dis
Enterprise Star Irons ..... 45 dis
Comoined Fluter and Sad Iron ..... ₱ doz $15, dis 15

Saw Sets.

Boynton's patent X Cut, per doz $12; Hand Saw, per doz $10. ..... dis 20
Stillman's Genuine, per doz $3 50 and $5 50 ..... dis 20
Stillman's Imitation, per doz $3 25 ..... dis 20&10
Common Lever, per doz $2 dis 30&10
Leach's No. 0 $8; No. 1 $15; dis 15
Hammer, Hotchkiss $5 50, dis 10
" Bemis & Call Co.'s new patent ..... dis 40&5
Bemis & Call Co.'s Lever and Spring Hammer .dis 30&5
Bemis & Call Co.'s Plate .. dis 10
" " Cross-cut dis 12½
Aiken's Genuine ..$13, dis 50&10
" Imitation .....$7, dis 50
Hart's Patent Lever ..... dis 20
Disston's Circular ..... dis 40

Scales. Dis

Fairbanks' 25

Screws. Dis

Flat head iron or steel per cent dis 30
Flat head brass 30
Round head iron or steel 25
Round head brass 20
Coach or lag ..... 55 ₱ ct

Tank Iron.

3-16, ¼ and ⅜ inch thick 3 20

Tacks. Dis

Black ..... 30—10
Tin'd ..... 55—10

Traps. Dis

New House 30
Peck, Stow & Co ..... 50—10

Vises.

Solid box, Dis 40

Wrenches.

Coe's genuine ..... 40 & 10
Coe's imitation wrought bar .. 0
Mechanics' 60 and 10

Bag Holders.

Sprengle's Pat, $18.00 per doz 40 per cent. dis.

Planes.

Ohio Tool Co ..... dis 25
Sciota ..... dis 30
Bailey's Pat. Adjustable. dis 25

Rules.

Stanley ..... dis 66⅔ and 10

Sash Locks. Discount.

Payson Mnfg. Co. "Perfect" .. 42
Simmons' Sash Supporters 20

Hinges.

Champion double acting spring hinges ..... dis. 30
Screw & Strap 8@12 in. ....$6. net
Gravity Locking Blind Hinges, Sargeant & Co. 70&10

Wire.

Brass and Copper ..... dis 20
Bright & annealed, Nos. 0 @ 18 dis 50@52½
" " Nos. 19 @ 26 dis 60
" " Nos. 27 @ 36 dis 65
Coppered .....Nos. 0 @ 18, dis 45
Galvanized, Nos. 0 @ 18, market list, ... dis 40@45
Tinned, Nos. 0 @ 18, ... dis 40@45
Cast steel ..... dis 40
Tinned Broom Wire, Nos. 18 @ 25 ..... dis 55
Annealed Fence, Nos. 8 and 9 ..... dis 55@52½
Annealed Grape, Nos. 10 to 14 ..... dis 52½
Galvanized Telegraph, Nos. 7 to 9 ..... ₱ lb 7¼c
Galvanized Telegraph, Nos. 10 to 11 ..... ₱ lb 8¼c
Galvanized Telegraph, No 12 ..... ₱ lb 10¼c
Fence staples .... ₱ lb 5½@5¾c
Fence Staples, galvanized, ₱ lb 7@7¼c
Stubs Steel Wire $7 00 to £
Barb Wire, painted 8¼c
Barb Wire, galvanized 9¼c
Crucible Steel Ropes from ¾ in. at 9c to 1¼ in. at 52c
Best Selected Iron Ropes from 3-16 in. at 8c. to 1¼ in. at 33c

Gas and Steam Fitters' and Machinists' Supplies.

Gas and Steam Pipe—See Pipe Wrought.
Enameled Pipe ..... dis 65
Artesian Well Casing .... net list
Hydraulic Tubes ..... net list
Malleable Iron Fittings .. net list
Cast Iron Fittings ..... dis. 55
Globe Valves ..... dis. 50
Angle Valves ..... dis. 45
Check Valves ..... dis. 45
Safety Valves ..... dis. 45
Eddy Gate Valves ..... dis. 20
Steam Cocks ..... dis. 45
Service Cocks ..... dis. 45
Ball Gauge Cocks (net per dozen) $15
Compression Gauge Cocks dis. 45
Miss. Gauge Cocks ..... dis. 45
Register Gauge Cocks (net per dozen) $15
Cylinder Cocks ..... dis. 45
Air Cocks (net per dozen) .. $2 75
Oil Cups ..... dis. 45
Steam Gauges ..... dis. 35
Water Gauges ..... dis. 45
Scotch Glass Tubes ..... dis. 60
Steam Whistles ..... dis. 45
Iron Body Globe Valves .. dis. 55
Iron Body Safety Valves .. dis. 55
Iron Body Steam Cocks .. dis. 55
Pipe Tools ..... special
Globe, Angle and Check Valves (Powell's regrinding) ..... dis. 45
Guarantee "Jet Pumps" dis 40
Mack's Injectors ..... dis. 25

Boiler Plates.

("Gaylord"—Standard Quality.)

C. No. 1 ..... 4 50
C. H. No. 1 Shell 4 60
C. H. No. 1, 50,000 ..... 5 00
C. H. No. 1, 55,000 ..... 5 50
C. H. No. 1 Flange 6 00
Firebox
T. S., 60,000 ..... (as per) .. 6 00
T. S., 65,000 ..... (act of) ..
Homo. Steel, 70,000 (of Cong) .8 00
Heads, ½c ₱ lb extra.

N.B.—Eastern brands of boiler plate at from 2-10 to 3-10c ₱ lb less than above prices.

Boiler Rivets—"Albany."

⅛, ¼, 11-16, and ⅝ in. diam .5 50

Sheet and Tank Rivets.

"Norway."

All sizes ..... dis. 15

Nuts, Bolts, etc.

Square & Hex. Nuts ....7 off list
Washers ..... 6 off list
Machine Bolts ..... dis 55
Bolt Ends ..... dis 55
Boiler Patch Bolts ..... net list

Boiler Tubes.

"National" Standard Gauge 1 inch to 10 inch ..... dis 37½
"National" Standard Gauge 11 inch to 15 inch ..... dis 25
"National" Special Locomotive Tubes ..... net list

Boiler Makers' Tools.

Doty's Power Shears .... net list
" Hand Lever Shears .. net list
" Power Punch ..... net list
" Hand Punch ..... net list
Steel Screw Punch ..... net list
Iron Screw Punch ..... net list
Boiler Plate Rolls ..... net list
Buffalo Forges & Blowers dis 20
Watson's " " net list
Spring Tube Expander .... dis 15
Roller Tube Expander .. net list
National Tube Cleaner ... dis 20
Wire Flue Brushes ..... net list
Anvils—"Peter Wright" 12½ ₱ lb
Solid Box Vises ..... net list

IRON AND STEEL.

Flat Bar.

1¼ to 4 by ⅜ to 1 inch 2 70
4¼ to 6 by ⅜ to 1 inch 2 80
1¼ to 6 by 1½ to 1½ inch 3 15
1¼ & 1¾ by ½ to ⅝ 2 80
1 & 1¼ by ¾ to ⅞ 2 90
⅛ & and ⅞ by ¾ to ⅝ 3 15

Round.

1 to 1⅞ inch 2 70
2 to 2⅝ 2 90
2⅝ to 3¼ 3 20
3⅜ to 4 ..... 3 70
4⅛ to 4½ 4 20
4¾ to 5 ..... 4 40

Square.

1 to 1⅞ inch 2 70
2 to 2⅝ 2 90
2⅝ to 3¼ 3 20
3⅜ to 4 ..... 3 70
⅛ to ⅞ 2 80

Heavy Band.

1¼ to 6 by ¼ and 5-16 inch. 2 90
1 to 1¾ by ¼ and 5-16 do 2 95
⅛ to ⅞ by ¼ and 5-16 do 3 00
⅛ to ½ by ¼ and 5-16 do 3 80

Half Oval and Half Round.

Wagon box iron ¾ and ⅞ .. 3 95
1-10c per lb extra will be charged for cutting to specified lengths

Light Band.

1¼ to 2¾ by ¼ to 3-16 ..... 3 25

Hoops.

1¼ to 2 , Nos 16 to 18. .... 3 90
2¼ to 3¼ do 13 to 15 ..... 3 80
1-10 extra for each gauge lighter

Sheet Iron.

No 22 to 24 ..... 4 50
No 25 to 26 ...4 30 offd. 4 50 asked
No 27 ..... 4 90
No 28 ..... 4 85

English Steel.

Best cast ..... ₱ lb 15½c
Extra cast 16½c
Round machinery, cast 14c
Swaged, cast 18c
Best double shear 15½c
Blister, 1st quality 13c
Refined tool steel 16½c
Spring calking ..... 7¼@7½c
German steel, best 11c
2d quality 10c
3d quality 9c
Sheet cast steel, 1st quality 15½c
2d quality 14½c
3d quality 12½c

American Steel.

Best brands of refined cast steel 12c
Crucible machinery ... 8c
Open-hearth ditto 5c
Hammer cast steel 9½c
Spring cast steel 7½c
Bessemer and open-hearth spring 5½c
Ditto plow 5½c
Steel boiler plate ..... 6¼@7c
Bessemer machinery ... 5 @6c
Spring and calking .... 7¼@7½c
Tire ..... 4 @4½c
Sleigh shoes ..... 3½@3¾c

Bessemer Steel Tire.

¾ to 1 by 3-32 ..... 4½ ₱ lb
¾ to 1 by ½ to 5-32 ..... 4½ ₱ lb
¾ to 1 by 3-16 to ¼ ..... 4½ ₱ lb

Miscellaneous Cast Steel.

Auger and auger bit 8
Axle steel for wagons 8
Frog points and plates 9
Frog size bars 7½
Pick, plain 8½
Pick, and Mattock, beveled. 8½
Skate steel 8½
Table cutlery 8½
Trap spring steel 9
Pike and cant hook 8½
Coal and granite wedge 8½

TINNER'S STOCK.

Tin.

Banca ..... per lb. 28c
Straits ..... " 25c
English ..... " 25c
Spot Tin ..... " 25c

Tin Plate.

10x14 IC charcoal ... $6 50@6 75
do IX do .... 8 25@8 50
12x12 IC do ... 6 75@7 00
do IX do 8 75
14x20 IC do ....6 50@6 75
do IX do ....8 25@8 50
do IXX do 10 50
do IXXX do 12 50
do IXXXX do 14 50
DC, 100 plate, charcoal 12¼x17 6 25
DX do 12¼x17 do ... 8 25
DXX do 12¼x17 do ... 10 25
DXXX do 12¼x17 do ... 12 25
DXXXX do 12¾x17 do ... 14 25
14x20, IC roofing do ... 6 25
do IX do do ... 7 50
20x28, IC do do ... 12 25
do IX do do ... 15 50

Pat Planished Sheet Iron.

(A) ..... per lb 10½c
(B) 9½c

Nos	10	15	21	25
to	14	20	24 & 26	
Com	3-60	3-80	4-00	4-20
Char	5-60	5-60	6-00	6-20

Sheets over 28 in. wide ¼c extra

Sheet Iron.

Galvanized, No 17 to 20 12
do do 22 to 24 13
do do 25 to 26 14
do do 27 15
do do 28 16
40 dis,
Russia Iron by bundle 12½

Zinc.

Sheet, cask ..... 7¼@ 7½
Sheet, open ..... 8@ 8¼

Tinners' Tools & Machines.

Machines (P. S. & W.) list add 20
Tools (P. S. & W.) ..... add 6

COPPER.

Lake Ingot ..... 19@19½c
Baltimore 19c
Arizona 18¾c

Sheathing Braziers Copper, Bolt-, &c.

Brazier's Copper, ordinary sizes, 16 oz. per sq. foot, and over per lb 30c
Braziers Copper, ordinary sizes, under 16 oz. and over 12 oz. per sq foot, per lb. 32c
Brazier's Copper, 10 oz. and 12 oz per sq ft. per lb. 34c
Brazier's Copper lighter than 10 oz per sq ft ..per lb 36c
Circles less than 84 inches in diameter per lb. 33c
Circles 84 inches in diameter and over .....per lb. 30c
Segment and Pattern sheets per lb. 33c
Locomotive Fire Box sheets per lb. 30c
Sheathing Copper, over 12 oz per sq ft. ...per lb. 28c
Bolt Copper ..... per lb 30c
Copper Bottoms..per lb 31@32c
No copper is Sheathing except 14x10 inches, and not to exceed 34 oz. to the sq. ft.

Tinning.

14x18 ..... per sheet 6c
All other size sheets, 2½c per square foot For tinning both sides, double the above amount.

BRASS.

Cash prices for Roll and Sheet Brass For less quantity than 100 lbs. add 3c per lb.

High Brass.

All Nos not thinner than to No 28, wider than 2 in. not wider than 14 inch 30c
All Nos to Mo. 28, inclusive, and widihs over 14 to 20 in. inclusive 35c
All Nos. to No 28, inclusive, and widths over 20 to 30 in. inclusive 38c
½c per lb. advance on each No above Nos. 28 to 38, inclusive.
All Brass thinner than No. 8 is Platers' Brass at 53c
Sheets 24x48, and all sheets cut to particular sizes and lengths under 30 inches, in width wider than 2 inches 37c

Low Brass.

4c per lb. more than High Brass.
Gilding metal 8c per lb. more than High Brass.
Platers' or Gold Metal
In Bars 48c
Sawed 51c
Planed or Polished .. 54c

For Slitting.

Metal in width in. to ¼ in. to No. 28, inclusive, 1c per lb advance.
Metal, in width 2 in. to 1 in., thinner than No. 28, 2c per lb. advance.
Metal, in width ¼ in. to ¼ in. thinner than No. 28, 5c per lb. advance.
Metal ¼ in. in width and less, 10c per lb. advance.
Any of the above widths cut to particular lengths, add 7c per pound.

PIPE, WROUGHT.

Standard Wrought Iron Lap Welded Steam and Gas Pipe.

Inside Diameter. Inches.	Plain, Price Per Foot.	Galvan or Enameled Per Foot.	Outside Diameter Inches.	Weight Per Foot.
⅛	08		.40	.24
¼	08	$0 11	.54	.42
⅜	09	12	.67	.56
½	11	15	.84	.85
¾	13½	19	1.05	1.13
1	19	28	1.31	1.67
1¼	27	40	1.66	2.26
1½	33	47	1.90	2.69
2	46	64	2.37	3.66
2½	75	1 00	2.87	5.77
3	95	1 30	3.50	7 55
3½	1 25	1 70	4 00	9 05
4	1 50	2 05	4.50	10 73
4½	1 75	2 40	5.00	12.49
5	2 25	3 00	5.56	14.56
6	2 75	4 00	6.62	18.76
7	3 75	....	7.62	23.00
8	4 75	....	8.62	28.00
9	6 50	....	9.68	34.40
10	8 00	....	10.75	40.64
12	12 00	....		54.65

Discount, plain, 55 per cent; galvanized, 52½ per cent.

PAINTS.

White Lead, Eng. oil ...9 @9½
do American do.. 7@7½
do do dry.. @7½
White Zinc F. oil .....10 @11½
do do dry..... 8 @10
do American. oil.... @9
do do dry....5½@6¼
Chinese blue..... ₱ lb 75 @80
Prussian do oil .. do 45 @55
Ultramarine blue do 18 @30
Celestial blue do 8 @10
Paris green do 25 @30
Chrome green do 8 @14
Fr Crown green do 16 @18
Eng Vermillion do 55 @60
Am Vermilion do 15 @22
Indian red dry do 9 @12
Venedian red, Eng do 1¾@ 2
Orange mineral do 10 @14
Rose pink do 10 @13
Red lead, Am do @ 7½
Carmine No 40 ₱ oz 60 @75
Umber burnt ₱ lb 4 @ 8
Sienna do 4 @15
Vandyke brown do 10 @12
Spanish brown do @ 1¼

SCRAP IRON AND OLD METAL

DEALER'S SELLING PRICES.

Net Tons.

No. 1 wrought scrap ..... $28@29
Sheet and hoop " ..... 12@13
Cast scrap, (No. 1 heavy). 19@21
Cast Scrap (Stove Plate). 14@15

OLD METALS.

Old copper per lb 16c
No. 1 H. Brass per lb 16
Heavy yellow Brass do 12
Light Brass per lb 10
Scrap Zinc per lb ..... @4
Tea Lead per lb ..... @4½
Heavy Lead per lb ... 4½@5

LEAD.

American, ₱ lb ..... 5¾@6c
Bar, ₱ lb ..... 7c net
Pipe, ₱ lb 7½c dis 10 per ct
Sheet, ₱ lb .. 8c dis 10 per ct
Tin-lined pipe ₱ lb 15c dis 10 per ct
Shot Drop 7c; Buck 8c
Chilled Shot 8c

Babbitt Metal.

N. P. U. ..... ₱ lb @9c
A. 28c., B. 25c., C. 15c.

COAL,

WHOLESALE.

Wholesale f.o.b vessel at Cleveland:

Carbon Hill and Monday Creek $2 65
Massillon 2 85
Brier Hill ..... 3 50@3 75
Pittsburgh 3 00
Salineville 2 50
Tuscarawas 2 25

RETAIL.—Delivered.

Massillon Lump $4 25
" Nut .. 3 75
Carbon Hill and Monday Creek, lump 4 00
Carbon Hill and Monday Creek, nut 3 75
75c less on cars by car load.
Anthracite Stove and Chestnut 7 15
Egg and grate 6 00

Hides and Leather.

Prime cured hides, 7½@7¾
Green hides ..... 6@6½
Bull, scrubby, badly scored or damaged, cured, two-thirds price.
Prime dry hides ..... 13@14
Horse hides, green $1 75@2 00
Horse hides, dry ..... $2 00@2 25
Prime cured veal calf, 12½
Prime Deacon Skins, salted 60c
Pelts, wool on .. 32@34
Fresh slaughter sheep 30@$1 50
Fresh slaughter lambs 50@60
Green calf skins 13
Hemlock rough ..... 23@24
Oak rough ..... 25@26
Oak sole ..... 37@40
Union harness ..... 32@35

GLASS.

(Per box of 50 feet)

SINGLE THICKNESS

6x8 to 10x15 ..... 7 50
11x14 to 15x24 ..... 8 50
16x24 to 20x28 ..... 9 75
15x34 to 24x30 ..... 10 75
26x28 to 24x36 ..... 11 50
26x36 to 26x44 13
26x46 to 30x50 ..... 14 00

DOUBLE THICKNESS

6x8 to 10x15 ..... 11 7
11x14 to 15x24 ..... 13 25
16x24 to 20x28 ..... 15 75
15x34 to 24x30 ..... 17 25
26x28 to 24x36 ..... 18 50
26x36 to 26x44 ..... 21 25
30x50 ..... 22 50
30x52 to 30x54 ..... 23 25
30x56 to 34x56 ..... 25 00
34x58 to 34x60 ..... 27 75
36x60 to 40x60 ..... 30 00
Dis 60 & 15 single, 60 & 20 double

OILS & AXLE GREASE

Pure Oils. packages included

Sperm, winter bleached per gal ..... @1 15
Elephant, winter bleached, per gal .... @ 70
Whale, winter bleached per gal ..... 60@ 65
Seal, winter bleached 80@ 85
Bank oil ..... 48 @ 51
Straits ..... 50 @ 53
"A" oil for tanner's use 35 @ 40
Lard oil extra W S .... 90 @ 95
do No 1 do ..... 76 @ 79
do No 2 do ..... 63 @ 66
Tallow oil ..... 65 @ 72
Neatsfoot oil pure 1 05
do No 1 90
Linseed oil, raw ..... @ 60
Linseed oil boiled 63
Cotton seed oil white .. 64 @ 66
do do yellow 60 @ 63
Carbon oil Ohio legal test ..... 9¼@11¼
West Virginia lubricating 28 deg ..... @ 29
Pure Mecca ..... 55@ 50
Paraffine oil winter pressed grav 25 ...
do do do 25@ 30
Machinery 40
Engine 50
Miners' oil ..... 40@45
Drilling oil 40

Compound Oils, (light color'd)

No 1 Sperm signal oil .. 65@ 68
No 2 do do .... 58@ 63
No 1 wool and spindle oil ..... 40@ 50
Golden machinery oil. 30@ 35
No 2 Mecca (dark colored) ..... 20@ 30

Axle Grease (light colored per gross ....7 50@ 8 00
Tallow, prime ..... 8¾@8¾
Tallow, dark and No. 2 6¾
Beeswax ..... 20@

Cleveland Business Directory.

Assayers and Analytical Chemists.

JUDSON, W. E, Analytical Chemist, 8 Cushing Block.

Bolt and Nut Works.

HOTCHKISS & GAYLORD, manuf'rs. Machine, Plow & Elevator Bolts, Coach Screws.

Boiler Makers.

SMITH & TEACHOUT—(Established 1857.) Boiler, Tanks, Stills etc. 439 Broadway.

Bridge Builders.

BUCKEYE BRIDGE AND CAR WORKS mfrs of Arch and Truss Bridges, Boiler Tanks and Oil Stills Betwen Wason street and Case Ave.

Coal and Iron Exchange.

JACKSON IRON CO. Iron Ore and Pig Iron. Rooms 8 and 9. Fayette Brown, Gen. Agent.

RHODES & CO. Coal, Iron Ore an Pig Iron. Rooms 1 and 2.

Carriage Blacksmith.

STRIEBEL, CHAS. manfac'r. of Carriages and Wagons and platform trucks. Horse shoeing and general blacksmithing .93 Woodland ave.

Carriage Bolts.

THE COLWELL & COLLINS NORWAY BOLT CO., manufacturers of Philadelphia Carriage and Tire Bolts.

Church and School Furnture.

FAULHABER, GEO. manufacturer of School and Church Furniture. Fine Hard Wood work a specialty. 203 Ontario Street.

Custom Boots and Shoes.

ROONEY, JOHN manufacturer of hand-made Boots & Shoes, custom made and warranted 177 Ontario Street.

Carriage Repository.

GREENE'S, J. O., Carriage Repository, 408 Superior street and 52, 54 & 56 Rockwell street, dealer in Fine Carriages. Repair shop in connection.

SLATER, G. A., Carriage dealer, sells the best work for the lowest price. A fine assortment always on hand. Repository 365 Euclid Avenue

Coal and Pig Iron.

ANDREWS, HITCHCOCK & CO., Briar Hill Coal and Pig Iron. 122 Water Street.

Distillers.

BLOCH, S. H. & E., Distillers, and wholesale dealers in Kentucky Whiskies. 66 Water St.

Electrical,

ELECTRIC SUPPLY CO. manfrs and dealers in Electric Burglar Alarms, Annunciators, Cell Bells and Batteries. Telephone lines built and repaired. 145 Seneca Street.

Fresco Artists.

KEMMER & KUSHMAN DECORATIVE CO., Fresco Artists, Fine Modern Wall Papers. 338 Euclid ave.

Foundries.

BOWLER & CO., Car Wheels, Patent Chilled Frogs, and all kinds of castings. 9 Winter.

CLEVELAND MALLEABLE IRON CO., manufacturers Malleable Iron Castins.

LAKE SHORE FOUNDRY, Water and Gas Pipe, Light and Heavy Castings. Alabama st.

TAYLOR & BOGGIS, successors to H. & H. F. Taylor, Iron Founders, 65 to 73 Central Way.

VIADUCT FOUNDRY COM'Y, Aenis, Carlin & Strangward manfrs of Machinery Castings Fine Light Castings a Specialty. Office & Works 11 13 15 and 17 Detroit Strert. near Center.

ECLIPSE IRON WORKS manufacture Castings of all kinds. Cor. Center & Winslow Sts

FITZSIMONS WM. & SON, Rolling Mill and Machinery castings. Rolls a Specialty. No. 435 Broadway.

File and Saw Works.

PARKIN, W. H. & CO., Hand-cut Files and Rasps, dealers in Disston's saws, 11 So. Water

Grindstones.

OHIO GRINDSTONE CO. manufacturers of and dealers in Grindstones. 127 Superior st.

Hotels.

FOREST CITY HOUSE, cor. Public Square and Superior st., Terrill & Ingersoll, Props.

KENNARD HOUSE, D. McClasky, Prop.

NEW ENGLAND HOTEL, Water st., W. W. Wolcott, Prop. Refitted and refurnished.

STRIEBINGER HOUSE, between Ontario and Seneca sts. $2.00 per day. Hawley & Langton

CITY HOTEL, Seneca street. H. B. West, proprietor. $1.50 per day.

Hides, Pelts and Leather.

DENNISON BROS., dealers in Hides, Pelts, Furs and Tallow. 48 and 50 River street.

Hardwood Lumber.

MARTIN, J. T. dealer in Hardwood Lumber, Stone's Levee, near Central Way.

Lumber.

WOODS, PERRY & CO., manufacturers and dealers in Lumber, Lath, etc., 5 Carter st.

FISHER, WILSON & CO., wholesale lumber dealers (pine & hard wood), rough and dressed lumber, timber, lath, shingles, etc. 47 Central Way

KRAUSE, C. A., & SON, wholesale and retail dealers in lumber. Yards cor. Superior and Wason and 281 Merwin streets.

Cleveland Business Directory.

Flue Cleaner.

CLEVELAND FLUE CLEANER M'F'G. CO. manufacturer of Aitchison & Doolittle's Patent Steam Flue Cleaner, 36 South Water Street.

Hardware and Iron.

BINGHAM, WM. & CO., Hardware, Iron, Nails and Metals, 148 and 150 Water street.

CLEVELAND ROLLING MILL CO., manuf'rs. of Steel and Iron Wire and Steel Tire.

WORTHINGTON, GEO. & CO., Hardware and Dealers in Metals. Water street.

Lime Manufacturers.

RUSSELL LIME CO., manufacturers of White Lime; also dealers in Plaster, Cement, etc. 85 Elm street.

Machinery and Boilers.

CLEVELAND STEAM FURNACE CO., Engines and Boilers, cor. Detroit and Center sts.

KRITCH, K. E. Metal Pattern Maker. Small machinery repaired. Lawn Mower sharpening a specialty. 42 South Water Street.

UNION MACHINE WORKS, Wason Street bet. St Clair and Superior Sts., manfrs and agents of G. W. Clayton's Elevators for passengers and freight. General machinists & jobbers.

PANKHURST, T. J. & CO., Valley Machine Works, manufacturers of Machinists' Tools, &c. Fine lathes a specialty. 6 Champlain street.

Machinery Depot.

CLEVELAND MACHINERY DEPOT, (now National Machinery Depot.) The largest stock of New and Second-hand Engines, Boilers and Machinists' Tools. Shop and Warehouse corner Bond and Superior streets.

Mercantile Agency.

THE MERCANTILE AGENCY. R. G. Dun & Co. proprietors. 121 Superior street.

Oil Manufacturers.

AMERICAN LUBRICATING OIL CO., manufacturers of lubricating oils, 23 Euclid ave.

Paints and Oils.

MASTERS, J. N. jobber in Paints, Oils, Varnishes. Brushes, 34 Prospect st.

Pattern and Model Makers.

WHITTINGHAM, J. & C., Metal Pattern and Model makers 62 Canal Street.

STAIR BUILDER.

PFEIL, CHAS, Stair Builder; Hard Wood Mantles and Office Railing. Works, 49 Canal street, Cleveland, Ohio

JOHNSON & PURSER, Stair Builders, and manuf'rs of Mantels, Odd Pieces of Furniture, &c. 30 West street, up stairs.

Steel Stamps and Stencils.

FLEHARTY, J. H. & CO., Rubber Stamps, Seals, Stencils. 197 Superior street.

Tanners.

GAENSSLEN BROS., Tanners, and dealers in leather, oil and shoe findings. 80 Water-st.

Trunks and Valices.

FABER, J. manuf. Trunk, Traveling Bags and Ladies' Fine Satchels. Sample Trunks and Cases a Specialty. 55 Public Square.

Vessel Agents.

WEBB, H. J. & CO., Ship Brokers and Vessel agents. 17 & 18 Board of Trade Building. 122 Water Street.

Wood Carving.

HERKOMMER, J., Carver and Ornamenter in Composition. 225 Erie street.

Business Directory.

Akron, O.

AKRON IRON CO., manufacture best Common, Refined and Charcoal Iron.

CASCADE HOUSE, cor. Mill and Summit sts., near Depot. J. Downie, Prop.

MCNEIL, J. C., Steam Boilers, Heavy Sheet Iron Work. Repairing promptly executed.

PERKINS, C. E., dealer in Agricultural Implements, machinery, and Manufacturers' Ag'nt

TAPLIN, RICE & CO., manuf'rs. of Stoves and Hollow Ware, dealers in Tinners' Stock, etc.

WEBSTER, CAMP & LANE MACHINE CO., Founders and Machinists, 12 Main street.

Alliance, O.

ARLINGTON HOUSE, cor. Main and Liberty Streets. Centrally located. Sample Room for Commercial Travellers. H. S. Adams, proprietor

ALLIANCE INDUSTRIAL WORKS, E. Fawcett & Son, Proprietors, manufacturers of portable and stationary steam engines and circular saw mills.

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DIEBOLD SAFE & LOCK CO., manuf'rs. Safes, Locks, Bank and Safe Deposit Works.

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Business Directory.

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TURNER, VAUGHN & TAYLOR, manufacture engines, presses and grinding machinery for clay; also paper, chain, wire and flour mill machinery. Send for Circulars and price list.

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COLUMBUS MACHINE CO. manfrs. of Blowing, Stationary and Portable Engines, Brass and Iron Castings. West End Nat. Road Bridge.

REYNOLDS BROS., manufacturers of hand-cut Files and Rasps. Old files re-cut. Send for Price List.

CITY BOILER WORKS, manfrs of Stationary, Portable and Locomotive Steam Boilers. All work warranted Borger Bros. & Co.

MURRAY, HAYDEN & CO., manfrs of Malleable Iron. Cor. Randolph & West streets.

RAGAN W. H. & O., manfrs of Doors, Sash and Blinds, Mouldings, Casings, Balusters, Newels, Hand railing, and Builders' Mill Work of every description. Cor. West Broad & Center.

Canal Dover, O.

HECKMAN, E., manufr. and dealer in harness leather, upper, kipp and calf. Also, manufacturer & dealer in prime English Dairy cheese. Highest market cash price paid for hides.

Garrettsville, O.

UDALL & NILES Foundry and Machine Shop. General repairing and jobbing on short notice

Geneva, O.

THE ENTERPRISE MACHINE CO., L. L. Crane, Pres't, manfrs of Machinists' Tools and Machinery Gear Cutting a specialty.

Lima, O.

LIMA HOUSE, centrally located; telegraph office in the house. J. Goldsmith, Prop.

Massillon, O.

TREMONT HOUSE, Jas. M. Clark, proprietor. Terms $1.50 per day. Good sample room for Commercial Travellers.

CITY CARRIAGE WORKS, P. H. Young, prop. manfact'r of Carriages, Phætons and Spring Wagons. Work warranted. Cor. Tremont & Erie.

Painesville, O.

NORTH AMERICAN CUTLERY CO., m'fr's of Steel Shears and Scissors—best quality.

Ravenna, O.

THOMPSON, T. F., dealer in Agricultural Implements, farm machinery, hardware, seeds, fertilizers, &c. Cor. Main and Prospect sts.

BALDWIN, D. L. & SON, Contractors & Builders and manfrs of all kinds of Moulding, flooring, siding, &c. Rip, Band and Scroll Sawing.

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FIELDING, RICHARD, proprietor Commercial Hotel, 222 Market street. Comfortable rooms and beds. Sample rooms for Commercial men.

Sandusky, O.

SANDUSKY WHEEL CO. manfrs. of Sarven Patent Wheels, Carriage Bodies and Seats, Plain Wood Hub Wheels, Banded Hub Wheels, Jacobs' Patent Neck Yokes.

WOOLWORTH, JAMES, manfr. of Axe, Pick, Sledge and Auger Handles, Hickory Whip Stocks, &c. Established in 1855.

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Toledo, O.

BAKER, HERBERT, Machine Shop and Iron Foundry. 98 and 100 Erie street.

TOLEDO FOUNDRY AND MACHINE CO. builders of Steam Engines, Circular Saw Mills and all kinds machinery. Water St., cor. Cherry

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TOD HOUSE, cor. Diamond and Market streets. Henkel & Bowman, Props.

Zanesville, O.

KIRK HOUSE, William Kirk, proprietor. $1.50 per day.

Business Directory.

Erie, Pa.

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Titusville, Pa.

FOSTER & MCKAY, dealers in boilers and engines, tubing, casing, old iron, rope, and all kinds of metals. Washington street, nr. Railroad.

Rochester, Pa,

OLIVE STOVE WORKS, (limited) manufacturers of Stoves and Hollow Ware.

Pittsburgh, Pa.

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Olean, N. Y.

MYRICK BROS. & CO., manufact'rs Engines and Boilers, oil drilling tools, rig irons, etc.

Rochester, N. Y.

GOWE, JNO. N., mfrs. of Specialties, such as Machine forging, bridge bolts and trusses, railroad switches, spike, mail, chisels, &c.

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ULSCHT & LINN mfrs of Wood Lathes, Engraving Machinery. &c 131 N. Water street

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WHITE, L. & I. J. manfrs of Coopers' Tools, Carpenters Tools, Draw Shaves, Cleavers Choppers, Ship Tools, &c. 312 Exchange street.

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	Arrive.	Depart.
No. 20 Limited Express	1:35 A.M	*1.50 A.M
No. 6 Atlantic Express	*7:05	*7 30
No. 10 Buffalo Accom	11:00	11.15
No. 8 C. & St. L. Exp.	*2:25 P.M	*2.55 P.M
No. 4 Special N. Y. Exp.	10:10	10.35
No. 2 San. Div. Accom.	10:12	
No. 12 Conneaut Accom.		4.50
Nottingham Accommodation (Sundays only)	10.05 A.M / 4.45 P.M	9.00 A.M / 2.15 P.M
No. 18 Elyria Accom.	8.50 A.M	

WEST BOUND TRAINS.

	Arrive.	Depart.
No. 13 Mich. Accom.		6.40 A.M
No. 1 Special Chicago Ex.	*6 35 A.M	7.00
No. 3 Toledo Express	1.25 P.M	3.30 P.M
No. 21 St. Louis Express	*1.40	*2.05
No. 5 Pacific Express	*7.05	*7.35
No. 11 Conneaut Accom.	8.40 A.M	
No. 19 Pt. Clinton Accom.		5.00
No. 7 Michigan Exp.	*2.50 A.M	*3.05 A.M
No. 17 N.Y. & Chi. Ex.	11.43 P.M	11.53 P.M

Cleveland, Columbus, Cincinnati & Indianapolis.

ARRIVALS.

No. 2 Col. & Cin. & Ind'polis Ex.	*7 10 A.M
No. 8 C. T.V. & W. & Clev Accom.	10 30
No. 12 St. Louis & New York Exp.	3 00 P.M
No. 4 Special Cin & New York Exp.	3 20
No. 10 Wheeling & Cleveland Exp.	8 25
No. 6 Indianapolis & Columbus Exp.	10 20

DEPARTURES.

No. 1 Cincinnati & Columbus Exp.	8 00 A.M
No. 11 Cleve. Indianap. & Wheel'g Ex.	7 15
No. 3 St. Louis & Cincinnati Ex.	*3 00 P.M
No. 5 Night Express	*7 25
No. 7 C T.V & W. & Col. Accom	4 00

Cleveland, Tuscarawas Valley & Wheeling.

ARRIVALS.

No. 4 Wheeling & Cleve'd Exp.	8 25 P.M
No. 2 Uhrichsville Accom.	10 30 A.M

DEPARTURES.

No. 1 Wheeling & Cleve'd Exp.	7 15 A.M
No. 3 Uhrichsville Accom.	4 00 P.M

New York, Pennsylvania & Ohio.

ARRIVALS.

No. 7 Mahoning Valley Accommo.	10 55 A.M
No. 3 New York Express,	*7 00 P.M
No. 1 New York Express,	*6 50 A.M
No. 3 Pittsburgh Express,	*7 00 P.M
No 5 Pittsburgh Express,	3 10
New York Express	3 10
No. 9 Youngstown and Pitts. Local	10 15

DEPARTURES.

No. 12 New York Express,	*7 10 A.M
No. 4 Youngstown Local,	11 15
No. 8 Mahoning Accommodation,	4 25 P.M
No. 2 New York Express,	10 45
No. 12 Pittsburgh Express,	*7 10 A.M
No. 6 Pittsburgh & Main Line Express	2 30 P.M

Cleveland & Pittsburgh.

DEPARTURES.		ARRIVE.
Mail	8 50 A.M	1 15 P.M
Express	1 50 P.M	7 25
Alliance Accommodation	3 45	10 10 A.M
Ravenna Accommodation	5 30	8 35
Night Express	†11 40 P.M	6 30 A.M

†Night Express runs daily, except Saturday, by way of Wellsville, and on Saturday by way of Alliance.

Valley Railway.

ARRIVE.		DEPARTURES.	
No. 2 Accom.	10 15 A.M	No. 1 Mail	*8 20 A.M
No. 6 Express	1 35 P.M	No. 3 Accom.	4 05 P.M
No. 4 Mail	6 30 P.M	No. 5 Exp.	6 30

Trains leave from Depot foot of South Water Street.

Connotton Valley Railway.

Arrive.		Depart.	
No. 1	10 05 A.M	No. 4	4 00 P.M
No. 3	7 15 P.M	No. 2	8 50 A.M

All trains arrive and leave depot corner Commercial and Fifth Streets.

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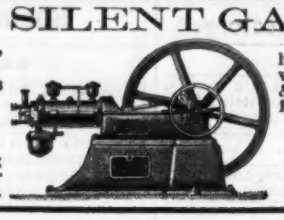
Working without Boiler, Steam, Coal, Ashes or Attendance.
Started instantly by a Match, it gives full power immediately.
When stopped all expense ceases.
No explosions; no fires nor cinders; no gauges; no pumps; no engineer or other attendant while running.



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FIRST PREMIUM STEAM
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REPAIRING DONE PROMPTLY.
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Dayton Malleable Iron Co.,
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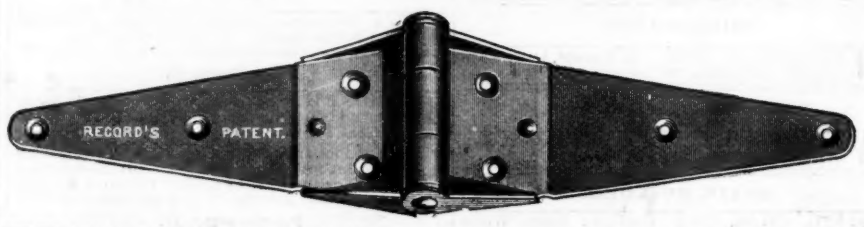
A full line of Carriage and Plow Hardware kept in stock.
Catalogues for the Trade.

Record's Patent Hinge.



THE MAIN PART of this Hinge is of the same style as the ordinary heavy strap. The joint is strengthened by FLANGED SUPPORTS, made of extra quality of iron, spanning the entire width of each leaf, firmly riveted to the back of the hinge. The pintle of the hinge passes through the ear of the flange, thus adding greatly to its strength. Also, by the additional thickness of iron, greatly STIFFENING THE HINGE where most liable to bend, and secure against breaking where the greatest part of the STRAIN COMES. As the straps of the hinge are bent down, forming an offset for the reception of the supports, the hinge is smooth or flat on the back, same as the ordinary hinge. These hinges are neat in appearance, and owing to their great strength admitting of smaller sizes being used than heretofore, renders them the most economical, as well as the most desirable hinges made. They are applied the same as ordinary hinges.

PRICES PER DOZEN PAIRS.
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Also manufacturers of
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Send for Circular and Price List, mentioning this paper.
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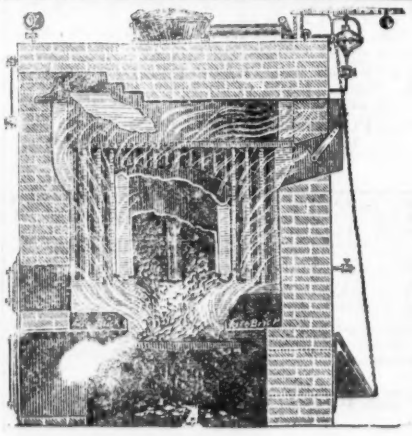

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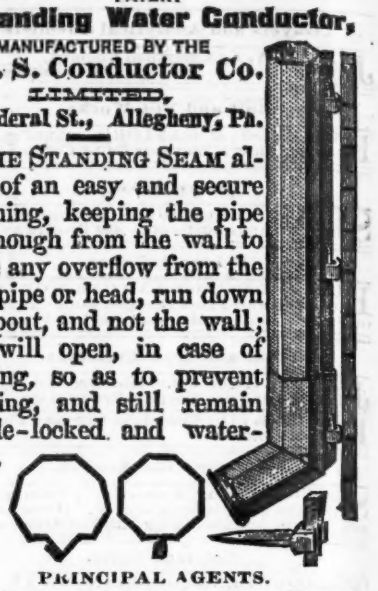
47 Federal St., Allegheny, Pa.



THE STANDING SEAM allows of an easy and secure fastening, keeping the pipe far enough from the wall to make any overflow from the eave pipe or head, run down the spout, and not the wall; and will open, in case of freezing, so as to prevent bursting, and still remain double-locked and watertight.

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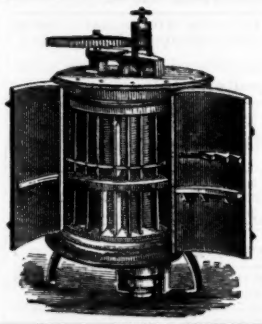

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Bran Dusters Brushes and Wire Cloth furnished to order at Lowest Prices.

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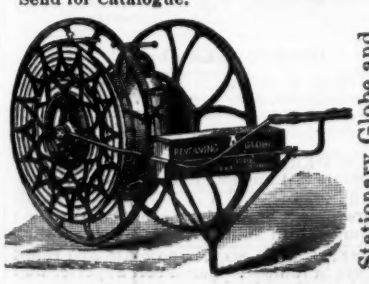

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Cleveland to New York,

VIA THE

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[Formerly Atlantic & Great Western Railroad.]

For New York, Boston and the East. The shortest and quickest route to Pittsburgh, Washington, Baltimore and the Southeast

Until further notice trains will leave the new Central Depot, South Water Street and Viaduct, as follows:

7:10A.M. LIGHTNING EXPRESS, (daily,) sleeping and hotel coaches from Leavittsburg. 8:55 a.m. To New York, Albany and Boston without change. Parlor car, Cleveland to Salamanca. Arrives at Meadville 11:20 a.m., (dinner); Franklin, 12:33 p.m.; Oil City, 1:00 p.m.; Corry, 1:00 p.m.; Jamestown, (Lake Chatauqua) 1:57 p.m.; Buffalo, 6:15 p.m.; Rochester, 8:30 p.m.; Hornellsville, 6:40 p.m., (supper); Corning, 8:25 p.m.; Elmira, 8:57 p.m.; Binghampton, 10:58 p.m.; Albany, 6:00 a.m.; Boston, 2:45 p.m.; arriving at New York, 6:50 a.m.

10:45 P.M. NIGHT EXPRESS, (daily except Sunday), Sleeping Coach from Leavittsburg to New York without change. Arrives at Youngstown 1:45 a.m.; Meadville, 3:50 a.m.; Corry, 5:20 a.m.; Jamestown, 6:22 a.m.; Buffalo, 9:45 a.m.; Rochester, 1:10 p.m.; Hornellsville, 11:20 a.m.; Corning, 12:58 p.m.; Elmira, 1:21 p.m.; Binghampton, 2:50 p.m.; New York, 9:25 p.m.

2:30 P.M. PITTSBURGH EXPRESS,—daily, through without change. Parlor Car, Cleveland to Pittsburgh, arrives at Youngstown, 5:00 p.m.; Pittsburgh, 8:25 p.m.; Washington, 7:30 a.m.; Baltimore, 8:15 a.m.; via Sharon and Sharpsville to Meadville 7:40 p.m.

4:25 P.M. MAHONING ACCOMMODATION, stopping at all way stations. Arrives at Youngstown, 7:30 p.m; Sharon, 8:30 p.m; Sharpsville 8:40 p.m; connects at Leavittsburg with train No. 20 for Meadville and intermediate points, arrives at Meadville, 11:05 p.m.

7:10 A.M. PITTSBURGH EXPRESS,—(daily) through without change. Arrives at Youngstown, 10:00 a.m.; Sharon, 10:30 a.m.; Sharpsville, 11:05 a.m.; Pittsburgh, 1:08 p.m. Returning, leave Pittsburgh, 4:35 a.m., 8:55 a.m., and 1:15 p.m. and 4:20 p.m.

11:15 A.M. YOUNGSTOWN & PITTSBURGH Accommodation, stopping at all Way Stations, arriving at Youngstown 2:10 p.m.; Pittsburgh, 6:10 p.m. Trains arrive at Cleveland, 6:50 a.m., 10:55 a.m. 3:10, p.m. 7:00 p.m., and 10:15 p.m.

☞ This is the only route by which passengers can reach Corry, Elmira, Binghampton, New York City, and intermediate points WITHOUT CHANGE. No change to Boston and New England cities.

Baggage Checked Through to All Points East

☞ Through Tickets and information regarding the route can be obtained at the Union Ticket Office, corner Bank and Superior streets; at office 131 Bank street, and at new Depot of New York, Pennsylvania and Ohio Railway, South Water street and Viaduct, Cleveland.

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Gen. Pass'r. Agt., Cleveland, Ohio.
M. L. FOUTS,
P. D. COOPER, Pass. Agt., 131 Bank st.,
Gen. Man'gr, Cleveland. Cleveland.

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No Emigrant Trains!
Connections in Union Depots for all Points.

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Sizes from 3½x6½ to 18x22.
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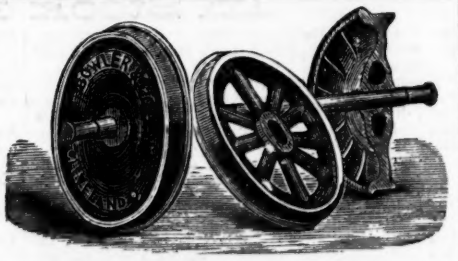

WM. McGILVRAY & CO.,
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The strongest, safest and most economical explosive
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Manufacturer of
Axes and Edge Tools.
JAMESTOWN, N. Y.
Send for prices to the Trade.

CLEVELAND & PITTSBURGH RAILROAD.

Trains leave and arrive daily, (Sunday excepted,) at the points named below, as follows:

MAIN LINE—GOING WEST.

	Western Expr'ss.	Mail Expr'ss.	Fast Line.	Accom
Leave				
Pittsburgh	7 30 a.m.	2 00 pm	11 50 pm	.....
Allegheny	7 40	2 10	12 00 am	.....
Arrive				
Rochester	8 23	3 00	12 50	.....
Beaver	8 30	3 05	12 55	.....
E. Liverpool	9 08	3 37	1 37	.....
Wellsville	9 18	3 47	1 50	.....
Salineville	9 57	4 24	2 33	.....
Bayard	10 34	5 02	3 21	.....
Alliance	11 05	5 25	3 55 am	.....
Leave				
Alliance	11 10	5 25	4 05	7 30 am
Arrive				
Ravenna	11 48	5 59	4 47	8 15
Hudson	12 13 p.m.	6 23	5 15	8 50
Cleveland	1 15 p.m.	7 25 pm	6 30 am	10 10 am

Accommodation train leaves Ravenna at 6.45 a.m., arrives Hudson 7.15 a.m., Cleveland 8.35 a.m.

☞ Mail Express runs through Parlor Car, Fast Line and Western Express through Sleeping Car. Pittsburgh to Cleveland.

NOTE.—Fast Line leaves Pittsburgh Sunday nights, but not on Saturday nights.

MAIN LINE—GOING EAST.

	Pittsb'g Expr'ss.	Fast Line.	Day Expr'ss.	Accom.
Leave				
Cleveland	8 00 am	1 50 pm	11 40 pm	3 45 pm
Arrive				
Hudson	9 05	2 50	12 50 am	4 55
Ravenna	9 37	3 17	1 18	5 30
Alliance	10 20	3 53	2 05	6 20 pm
Bayard	10 54	4 16	2 49	.....
Salineville	11 40	4 51	3 40	.....
Wellsville	12 20 pm	5 20	4 35	.....
E. Liverpool	12 54	5 44	4 57	.....
Beaver	1 30	6 17	5 47	.....
Rochester	1 35	6 22	5 52	.....
Allegheny	2 30	7 05	6 45 am	.....
Pittsburgh	2 40	7 15	6 55	.....
Harrisburg	.....	3 50 am	4 00 pm	.....
Baltimore	.....	7 30	7 20	.....
Washington	.....	9 02	8 47	.....
Philadelphia	.....	7 20	7 35	.....
New York	.....	10 25	10 35	.....
Boston,	.....	8 00 pm	.....	.....

Accommodation train leaves Cleveland Union Depot at 5.30 p.m., arrives Hudson 6.50 p.m., Ravenna 7 20 p m.

All trains connect at Yellow Creek for Wheeling and Bellaire.

☞ Pittsburgh Express runs a Parlor Car Cleveland to Pittsburgh. Fast line runs Through Sleeper to New York. Day Express runs Through Sleeper to Pittsburgh.

TUSCARAWAS BRANCH.

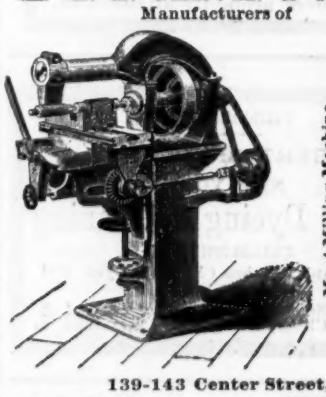
Trains leave Bayard at 11.00 a.m. and 5.10 p.m. arrive Minerva 11.08 p.m and 5 20 p.m : arrive Dover 12.18 p.m. and 7.15 p.m., New Philadelphia 12.30 p.m. and 7.30 p m. Rerurning leave New Philadelphia at 7.00 a. m. and 2.05 p. m., Dover at 7.30 a.m. and 2.15 p m., Minerva at 9 45 a.m. and 3.23 p m., Bayard at 10.00 a.m and 3.33 p.m.

All trains daily except Sunday.

D. W. CALDWELL, General Manager. E. A. FORD, Gen'l Pass. & Tkt. Agt. Pittsburgh, Pa.

E. E. GARVIN & CO.

Manufacturers of



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Hand Lathes, Tapping Machines, Cutter Grinders and Wood Planers. Milling Cutters, all shapes and sizes. Gear Cutting and Milling in all its branches.
No. 4 Milling Machine.

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☞ Send for Illustrated Catalogue.

SAFETY STEAM, WATER & HAND POWER
GIVE HATCH SIZE, & ELEVATION OF **ELEVATORS.**
BUILDING, & SEND FOR ILLUSTRATED CIRCULAR
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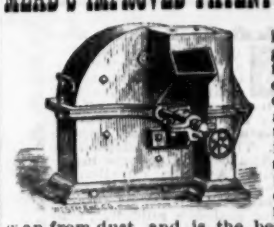
MEAD'S IMPROVED PATENT DISINTEGRATER.



For disintegrating, granulating or grinding without friction all kinds of material. It requires less power and grinds faster than any machine in the market. Is strong and simple; not liable to get out of order; no annoyance to workman from dust, and is the best machine in the market for grinding sugar, glue, sumac or drugs. Descriptive pamphlets will be sent free on application to MEAD & CO., 32 Atwater street, DETROIT, MICH.

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Men sent to all parts of the country, and no boys sent to do a mechanic's work.
All Orders promptly attended to.

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NERVOUS and debilitating diseases; a thirty years' specialty; the result of treatment exhibiting irrefragably how enfeebled health and vitality, arising from enervating influences, ove taxation, etc., may be re-established and all impediments removed. The remedies adopted are such that beneficial results become manifest immediately. Average duration of treatment necessary for restoration, forty days. **"Treatise and Form of Correspondence"** for patient's guidance, sent in plain envelope on receipt of two cent stamps, but where convenient *visit preferred*. Separate consulting rooms. Hours 8 A. M. to 9 P. M.
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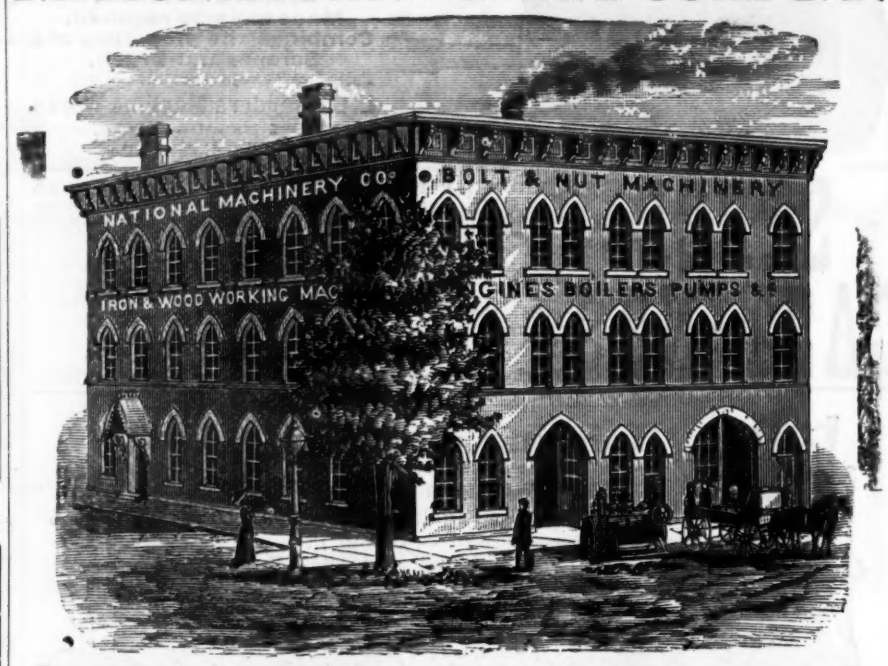

Cor. Bond & Rockwell Streets, Cleveland, O.
SALESROOM—384 SUPERIOR STREET, CORNER BOND.
Manufacturers of
"National" Bolt and Nut Machinery,
Agents and Stock kept of Pratt & Whitney's Screw Cutting Tools, Taps, Dies, &c. Agents for J. A. White's, Levi Houston's and J. S. Graham & Co.'s Wood Working Machinery.
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One 4-horse power Engine and Boiler.
One 6-horse power Engine and Boiler
One 7-horse power Engine and Boiler.
One 10-horse power Engine and Boiler.
One 5-horse power Engine.
One 8-horse power Engine.
One 12-horse power Engine.
One 25-horse power Engine. New.
One 30-horse power Engine. New.
One 35-horse power Engine. And several others all in stock.
New and Second Hand Belting, Pulleys, 2 Water Motors, &c., &c.

List of Wood Tools.

One second-hand Frank two-spindle Shaper, $65.
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One " " " " Spoke and Handle Lathe $125
One " " 22 inch Greenwood Heading Planer, $125
One " " Ellis Blind Slat Tenoner.
One " " 24-inch Ball & Co., Planer and Matcher.
One " " Power Rod and Dowell machine
One " " Fay & Co. No. 1 Railway Cut-off Saw.
Two " " Sandpaper Drums.
One second-hand Dimension Planer, 24-inches, with Feed attachment.
One " " wood frame swing Cut-off Saw and Table.
One " " Slotting machine.
One " " Thorn & Dehaven Drill.
Two " " Saw Tables.
One wood frame 6 inch Sticker.
Large lot second-hand Trenton Vises.
Large lot second-hand Anvils.
One Fay & Co. Agricultural Morticer, with boring attachment.
One Fay & Co. iron frame Tenoning machine, double heads.

Having moved our Salesroom to the large room previously occupied by the Wilson Sewing Machine Company, we are able to carry a very fine line of Wood Working Machinery and other Tools.

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For Doors, Sash, Blinds and Windows,
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Manufacturers of
Power and Foot Presses,
Dies and Tools
FOR WORKING
Sheet Metal and Wire.

FRUIT CAN
And Tinners' Tools, &c.
Nos. 147 and 149 Elm Street,
BUFFALO, N. Y.

Cleveland, Akron and Columbus RAILROAD.

Trains leave and arrive daily (Sundays excepted) at the points named below.

GOING SOUTH.

STATIONS. February 20, '82.	Miles	Mail and Expr 2	Thro' Pass'gr 4	Accom 6	Accom 8
		A.M.	P. M.	P. M.	
Cleveland		8.00	1.50	3.45	.....
Hudson (1)	0	9.15	3.00	5.05	.....
Cuyahoga Falls	8	9.32	3.18	5.23	.....
Akron (2)	14	9.47	3.33	5.36 / 5.50	.....
Clinton	27	10.17	4 04	6.23	.....
Warwick	28	10 23	4.10	6 31	.....
Marshallville	33	0 65	4.23	6.45	.....
Orrville (4)	39	10.51	4.43	7 03	.....
Fredricksburg	52	11.22	5.16	7.37	.....
Holmesville	56	11.34	5 28	7.52	A. M.
Millersburg	62	11 48	5.41	8.05	5.40
		P.M.			
Killbuck	68	12.02	5 55	.....	5.54
Black Creek	74	12.16	6.09	.....	6.08
Gann	84	12.41	6.35	.....	6.33 / 6 53
Danville	88	12 55	6.49	.....	7.07
Howard	91	1.05	6.59	.....	7.18
Gambier	95	1.15	7.11	.....	7.29
Mt. Vernon (5)	100	1.30	7.27	.....	7.43
Mt. Liberty	109	1.58	7.47	.....	7 59
Centerburg (6)	114	2.08	7.57	.....	8.19
Condit	120	2 22	8 11	.....	8.24
Sunbury	124	2.31	8 20	.....	8 35
Galena	126	2.36	8.26	.....	8.41
Westerville	133	2.51	8 42	.....	8.58
Columbus (7)	145	3.15	9.06	.....	9 23

GOING NORTH.

STATIONS. February 20, '82.		Thro' Pass'gr 1	Mail Expr 3	Accom 5	Accom 7
		A M.	P M		P.M.
Columbus	0	6.00	12.15	.....	5.05
Westerville	12	6 25	12 41	.....	5.32
Galena	19	6.41	12.57	.....	5.49
Sunbury	21	6.47	1.03	.....	5.55
Condit	25	6.56	1.13	.....	6 06
Centerburg	31	7.10	1 27	.....	6.20
Mt. Liberty	36	7.20	1 38	.....	6.32
Mt. Vernon	45	7.43	2.02	.....	6.59
Gambier	50	7.55	2.15	.....	7.11
Howard	54	8.05	2.25	.....	7 23
Danville	59	8.15	2.36	.....	7.34
Gann	63	8.30	2.50	.....	7.49
Black Creek	71	8.56	3.15	.....	8.15
Killbuck	77	9.10	3.28	.....	8.29
				A. M.	
Millersburg	83	9.26	3.43	5.50	8.42
Holmesville	89	9.37	3.55	6.05	.....
Fredricksburg	93	9 49	4.06	6.18	.....
Orrville	106	10.23	4.43	6.50 / 7.10	.....
Marshallville	112	10.35	4 55	7.28	.....
Warwick	117	10.46	5 09	7.37	.....
Clinton	118	10.52	5.15	7.46	.....
Akron	131	11.28	5.47	8.22	.....
Cuyahoga Falls	137	11.41	6 00	8.35	.....
Hudson	145	12.00 M	6.18	8.55	.....
Cleveland		1 15 P M	7 25	10.10	.....

N. MONSARRAT, Gen'l Supt. Akron, O
E. T. AFFLECK, General Passenger Ag't, Columbus, O.

E. Fawcett. R. B. Fawcett.
E. FAWCETT & SON,

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ALLIANCE INDUSTRIAL WORKS,
Manufacturers of
STEAM ENGINES,
and Circular Saw Mills.
Specialty of Portable Saw Mills and High Speed Engines.
ALLIANCE, OHIO.

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"Independent Lock Lever"

HAY AND GRAIN RAKE.
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